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CIVILIAN SCIENCE AGENCIES' IMPLEMENTATION OF THE GOVERNMENT PERFORMANCE AND RESULTS ACT (GPRA)

Y 4.SCI 2:104/73

Civilian Science Agencies' Implemen...

HEARING

BEFORE THE

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTH CONGRESS

SECOND SESSION

JULY 10, 1996

[No. 73]

Printed for the use of the Committee on Science

DEPOSITORY
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CONTENTS

WITNESSES

Page

July 10, 1996:

- Richard N. Zare, Professor, Department of Chemistry, Stanford University ... 21
- James C. McGroddy, Special Advisor to the Chairman and Senior Vice President, IBM Corporation ... 30
- Ernest J. Moniz, Associate Director for Science, Office of Science and Technology Policy, The White House ... 43
- Anne Petersen, Deputy Director, National Science Foundation ... 68
- Marc Chupka, Acting Assistant Secretary for Policy and International Affairs, U.S. Department of Energy ... 77
- Robert E. Hebner, Acting Deputy Director, National Institute of Standards and Technology ... 226
- Diana H. Josephson, Deputy Under Secretary, U.S. Department of Commerce, National Oceanic and Atmospheric Administration ... 238
- Henry L. Longest II, Deputy Assistant Administrator for Management, Office of Research & Development, U.S. Enivironmental Protection Agency ... 259
- Gary A. Steinberg, Director for Strategic Management, National Aeronautics and Space Administration ... 269

APPENDIX

Responses to Post-Hearing Questions ... 287

CIVILIAN SCIENCE AGENCIES' IMPLEMENTATION OF THE GOVERNMENT PERFORMANCE AND RESULTS ACT

WEDNESDAY, JULY 10, 1996

U.S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE,
Washington, DC.

The Committee met at 12:00 noon in room 2318 of the Rayburn House Office Building, the Honorable Robert S. Walker, Chairman of the Committee, presiding.

The CHAIRMAN. The hearing will come to order.

The hearing today is called for the purpose of examining the civilian agencies' implementation of the Government Performance and Results Act.

Let me say at the outset that we appreciate the witnesses from both panels who are going to join us today to look at this very important initiative, where we are, and possibly where the initiative will take us in the future.

The United States' scientific enterprise is acknowledged to be the best in the world. However, in this era of intense global competition and limited Federal resources, we need to ask the question.

How can we make it even better?

The Government Performance and Results Act (GPRA) provides policymakers with the tools to do just that: to make our Federal civilian science programs even more productive.

The GPRA was enacted on August 3, 1993, to encourage greater efficiency, effectiveness, and accountability in Federal spending.

The Act shifts the emphasis of Federal program management from inputs such as staffing and activity levels, to outputs and outcomes that are more reflective of the value of these programs to improving the Nation's standard of living.

In particular, the GPRA will aid Congress and the Administration in our quest to set priorities for Federal science and technology, and to restructure Federal research and development policy.

At the time of enactment of GPRA, it was recognized that both the scientific community and our colleagues on the Committee on Government Reform and Oversight, the committee with primary jurisdiction, that assessing the performance of Federal science programs would pose a special challenge.

Although full-scale government-wide implementation of the Act is not required to begin until Fiscal Year 1997, all of the civilian science agencies have been actively involved in strategic planning, developing performance assessment processes, and examining the issues and implications pursuant to the Act. Particularly because of the special challenge to the civilian science agencies, it is imperative that Committee on Science now become engaged with the implementation process at this early stage.

As such, today's hearing marks the beginning of what will be an ongoing dialogue.

Today we will hear from distinguished members of the scientific community, industry, and the Administration regarding the opportunities and challenges posed by the GPRA as we move forward with its implementation.

The first panel will address generic issues regarding research accountability, industry's experience with performance assessment and managing their R&D, and the Administration's overarching policy on the implementation of GPRA in the civilian science agencies.

The second panel is comprised of witnesses from each of the civilian science agencies under the jurisdiction of the Committee on Science. They will discuss the status, plans, and issues regarding the implementation of GPRA at their respective agencies.

In addition, we have requested that the General Accounting Office provide a written statement for today's hearing. I ask unanimous consent that it be included in the record at this point.

[The prepared statement of the General Accounting Office follows:]

United States General Accounting Office

GAO

Testimony
Before the Committee on Science
House of Representatives

Not to Be Released
Before 12:00 noon EDT
Wednesday
July 10, 1996

MANAGING FOR RESULTS

Key Steps and Challenges In Implementing GPRA In Science Agencies

Statement for the Record by
L. Nye Stevens, Director, Federal Management
and Workforce Issues, General Government Division; and
Victor S. Rezendes, Director, Energy, Resources,
and Science Issues, Resources, Community, and Economic
Development Division

MANAGING FOR RESULTS: KEY STEPS AND CHALLENGES IN IMPLEMENTING GPRA IN SCIENCE AGENCIES

Summary of Statement for the Record By
L. Nye Stevens, Director, Federal Management and Workforce Issues
General Government Division;
and
Victor S. Rezendes, Director, Energy, Resources, and Science Issues
Resources, Community, and Economic Development Division

The commitment to reduce the deficit is forcing Congress and the executive branch to undertake a basic reexamination of the value of programs across the federal government and is placing pressure as never before on all federal agencies, including the civilian science agencies, to clearly demonstrate that they are making effective use of taxpayers' dollars.

The landmark Government Performance and Results Act (GPRA) provides a legislative vehicle for Congress and agencies to use to improve program effectiveness and make the difficult trade-offs that the current budget environment demands. GAO's recently released Executive Guide: Effectively Implementing the Government Performance and Results Act discusses three key steps for federal agencies to successfully implement GPRA. These three steps are (1) define mission and desired outcomes, (2) measure performance, and (3) use performance information. The experiences of civilian science agencies suggest that each one of these steps offers important opportunities for improving agency management and congressional decisionmaking.

GAO work has shown that the effectiveness of the Department of Energy, the National Aeronautics and Space Administration, and a host of other agencies has been hampered by unfocused missions and unclear goals. GPRA is intended to provide this focus, in part by requiring that agencies develop strategic plans based on consultation with Congress and other stakeholders. These consultations are an important opportunity for Congress and the executive branch to jointly reassess and clarify the agencies' missions and desired outcomes.

Measuring the performance of science-related projects can be extremely difficult because a wide range of factors determine if and how a particular research and development (R&D) project will result in a commercial application or have other benefits. It can also take many years between when a research project is undertaken and when the outcome occurs. Due to the difficulties in measuring performance, R&D agencies typically have chosen to measure a variety of proxies for outcomes, such as the number of patents resulting from the federally funded research and expert review and judgments of the quality and importance of research findings.

As to be expected during the initial efforts of such a challenging management reform effort as GPRA, most agencies, including science agencies, are still struggling to integrate the mission-based goal-setting and performance measurement requirements of GPRA into their daily program operations. This integration is important because GPRA performance information is to be used to guide an array of congressional and executive branch decisions. Consistent congressional interest--in hearings such as today's, for example--on the status of an agency's GPRA efforts, the performance measures it is using, and how performance information is being used to make decisions will send an unmistakable message to agencies that Congress expects GPRA to be conscientiously implemented.

Mr. Chairman and Members of the Committee:

We are pleased to have this opportunity to discuss the key steps and challenges in using the Government Performance and Results Act (GPRA) to improve federal civilian science agencies' management and congressional decisionmaking.

Each year, American taxpayers invest about $70 billion of federal funds in military and civilian research and development (R&D) efforts. Over the years, this investment has yielded substantial benefits to the health, welfare, and security of the American people. Yet the powerful pressures to reduce the deficit are forcing Congress and the executive branch to undertake a basic reexamination of the value of programs across the federal government and to update the nation's spending priorities. The effort to reduce the deficit is therefore placing pressure as never before on all federal agencies, including the civilian science agencies, to clearly demonstrate that they are making sound and effective use of taxpayers' dollars.

Fortunately, the landmark GPRA provides a legislative vehicle for agencies to use as they seek to demonstrate and improve their effectiveness. Equally important, if successfully implemented, GPRA should help Congress make the difficult funding, policy, and program decisions that the current budget environment demands. Under GPRA, agencies are to set strategic and annual goals, measure performance, and report on the degree to which goals are met. Congress intended for GPRA to fundamentally shift the focus of federal management and accountability from a preoccupation with staffing and activity levels to a focus on "outcomes" of federal programs. Outcomes are results expressed in terms of the difference federal programs make in people's lives.

In crafting GPRA, Congress recognized that the types of management changes that successful implementation will require will not come quickly or easily for many agencies. As a result, GPRA is being phased in initially through almost 70 pilot projects during fiscal years 1994 through 1996 to provide agencies with experience in meeting its requirements before governmentwide implementation in the fall of 1997. Several agencies with a major civilian science focus, such as the Department of Energy (DOE), the Environment Protection Agency, the National Oceanic and Atmospheric Administration, and the National Science Foundation (NSF), have programs that are included in the pilot phase of GPRA.

Our recently released Executive Guide: Effectively Implementing the Government Performance and Results Act, which, at the request of the Committee, we are providing for the record, is intended to help federal managers implement GPRA and make the difficult transition to a form of management and accountability that stresses outcomes.[1] In the guide, we discuss three key steps for federal agencies to successfully implement results-oriented management. These three steps are (1) define mission and desired outcomes, (2) measure performance, and (3) use performance information. The guide shows the relationship of these steps to GPRA and highlights important practices associated with each step. The guide also discusses the role of top leadership in implementing GPRA and the practices leaders can follow to make GPRA a driving force in federal decisionmaking. Accompanying the discussion of each practice is a case illustration describing a federal agency that has made progress incorporating the practice into its operations. The practices discussed in the guide emerged from the experiences of leading public organizations here and abroad and have been shown to be effective in the federal management environment. These practices provide a useful framework for agencies working to implement GPRA and for assessing their progress.

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[1] Executive Guide: Effectively Implementing the Government Performance and Results Act (GAO/GGD-96-118, June 1996).

Our comments today use that framework to underscore the opportunities and challenges to using GPRA as a vehicle that agencies and Congress can employ as they seek to improve the effectiveness and efficiency of civilian science programs. Our comments are based on completed and ongoing reviews of efforts to implement GPRA in pilot and nonpilot agencies across the federal government and of the management of civilian science agencies.

STEP 1: DEFINE MISSION AND DESIRED OUTCOMES

Our work has shown that all too frequently individual agencies have lacked clear missions and goals, and related agencies' efforts have not been complementary. Moreover, legislative mandates may be unclear and Congress, the executive branch, and other stakeholders may not agree on the goals an agency and its programs should be trying to achieve, the strategies for achieving those goals, and the ways to measure their success. Thus, many agencies cannot confidently answer the basic questions in defining a mission--what is our purpose, whom do we serve, and how do we meet our mission? GPRA seeks to address these problems by requiring executive branch agencies to develop strategic plans that are to define missions and articulate strategic goals.

Although statutory requirements are to be the starting point for agency mission statements, agencies are to consult with Congress and other stakeholders in defining their missions. In the case of Congress, this may entail identifying legislative changes that are needed either to clarify Congress' intent and expectations or to address differing conditions and citizens' needs that have arisen since initial statutory requirements were established. Congressional consultation may also involve obtaining guidance on Congress' priorities in those frequent cases where agencies have more than one statutory mission.

Clarifying Agencies' Missions

These consultations are an important opportunity for Congress and the executive branch to work together in reassessing and clarifying the missions of federal agencies and the desired outcomes of agencies' programs. For example, our work has shown that DOE sorely needs a reevaluation of its basic mission, including its significant science responsibilities.[2] DOE's mission and priorities have changed dramatically over time so that DOE is now very different from what it was in 1977 when it was created in response to the nation's energy crisis. While energy research, conservation, and policymaking dominated early DOE priorities, national defense and environmental clean-up now overshadow those efforts. Meanwhile, new mission areas in science and industrial competitiveness, such as applied R&D programs supporting technology to secure future energy supplies, have emerged and are pressing for priority attention.[3] Each new phase in DOE's evolution has been accompanied by new leadership with vastly different agendas concerning DOE's basic mission and how it should be managed.

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[2] Department of Energy: Need to Reevaluate Its Role and Missions (GAO/T-RCED-95-85, Jan. 18, 1995).

[3] For an assessment of DOE's efforts in this research area see DOE's Success Stories Report (GAO/RCED-96-120R, Apr. 15, 1996), and Energy R&D: Observations on DOE's Success Stories Report (GAO/T-RCED-96-133, Apr. 17, 1996).

The DOE national laboratories, in which DOE estimates it has invested over $100 billion in the last 2 decades, are a specific area where our work and the work of others have shown a longstanding need for clarified missions.[4] We have reported that DOE had not coordinated the laboratories' efforts to solve national problems but had managed each laboratory on a program-by-program basis. The laboratories' missions were set forth as broad goals and activity statements rather than as a coordinated set of objectives with specific implementation strategies for bringing together the collective strengths of the laboratories to meet pressing national needs. As a result, DOE was unable to address issues that required cooperation and coordination across its many mission areas. For example, we reported that although solutions to the proliferation of nuclear weapons require expertise in identifying the effects of weapons, the research on nonproliferation and effects of weapons was carried out in different laboratories and was managed by different assistant secretaries. Overall, laboratory managers said that they feared that the lack of proper departmental direction was compromising both their effectiveness and their ability to respond to new national priorities.

Planning-related problems were not unique to DOE. As another example, our past work at the National Aeronautics and Space Administration (NASA) showed the need for NASA to develop a strategic plan that realistically matched its program plans to its likely budgets.[5] NASA strategic planning efforts in the early 1990s were incomplete and unrealistic because they did not indicate the relative priority of NASA's key missions and large programs and provided no balance between planning and budgeting. For example, NASA's failure to ground its goals in realistic budget expectations forced it to make significant program adjustments to make up for the lower-than-planned funding levels. Over the past several years we have reported that space shuttle operations, the space station, the Advanced X-Ray Astrophysics Facility, the Earth Observing System, and other NASA programs and projects had been or were being restructured primarily because they were not deemed affordable.

---

[4] See, for example, Department of Energy: National Laboratories Need Clearer Mission and Better Management (GAO/RCED-95-10, Jan. 27, 1995).

[5] See, for example, NASA: Major Challenges to Management, (GAO/T-NSIAD-94-18, Oct. 6, 1993).

Both DOE and NASA are undertaking strategic planning efforts intended in part to address these longstanding problems. Sustained congressional involvement in these efforts and similar planning efforts undertaken by other agencies are vital to ensuring that missions are focused, goals are clearly established, and strategies and funding expectations are appropriate and reasonable. The experiences of leading organizations suggest that planning efforts that have such characteristics can become driving forces in improving the effectiveness and efficiency of program efforts. The GPRA strategic planning process thus provides Congress with a potentially powerful vehicle for clarifying its expectations for agencies and the program results expected from funding decisions.

Identifying and Addressing Crosscutting Issues

Thus far our comments have been directed toward how congressional involvement in agencies' strategic planning processes can improve programs and aid congressional decisionmaking as it relates to the individual agencies. Equally important, we believe, is congressional involvement in strategic planning for program efforts that cut across several agencies. This is particularly true for science programs where, in many cases, the greatest return for the federal dollar can come through the coordinated efforts of a number of agencies. Not surprisingly, given the planning problems that individual agencies have confronted, program efforts that involve several agencies also have suffered from a lack of focus and unclear goals.

For example, we also have reported that the multiagency High Performance Computing and Communication (HPCC) initiative could benefit from a strengthened program direction.[6] Our work showed that a more focused management approach and an identification of priority areas were needed to help ensure that the program's goals were met. The HPCC program was originally established, by design, as a loosely coordinated, scientifically oriented research effort rather than a rigorously managed development program. Once the administration expanded the role of HPCC to support the national information infrastructure, a more rigorous and coordinated management approach was required that better targeted the specific technology areas that most needed to be developed to support the information superhighway. The HPCC effort at NSF, an agency with a major role in the program, is one of NSF's four GPRA pilot projects. NSF is using GPRA as a vehicle for clarifying the long-term goals for its HPCC program and developing performance measures to gauge progress.

As Congress works with agencies on the development of the agencies' strategic plans, it can identify other instances of potential overlap or uncoordinated programs by insisting that agencies show how their programs are aligned with appropriate efforts from other agencies.

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[6] The HPCC program was first included in the President's budget in fiscal year 1992 as a coordinated effort among nine federal agencies to accelerate the availability and use of the next generation of high performance computers and networks. In 1993, the administration expanded the scope of the HPCC program to include a broader range of applications that would have a more direct, near-term impact on the national information infrastructure, also known as the "information superhighway." See High Performance Computing and Communications: New Program Direction Would Benefit From a More Focused Effort (GAO/AIMD-95-6, Nov. 4, 1994).

One area where such an approach could prove helpful is in looking at the federal government's vast array of R&D laboratories. In response to our survey, 17 federal departments and independent agencies identified 515 federal R&D laboratories that spent a total of $26.6 billion in fiscal year 1995.[7] Federal agencies also supported, primarily through contracts and grants, a wide range of R&D performed by businesses, universities, and other organizations.

The Office of Management and Budget (OMB) recognizes the key role that the development of strategic plans under GPRA can have in helping to ensure federal efforts across agencies are properly coordinated. OMB is now undertaking a "Summer Review" during which it is examining the progress that agencies are making in meeting the GPRA strategic planning requirements. As part of that review, OMB is seeking to identify any steps that should be taken on a multiagency basis to coordinate and harmonize goals and objectives for cross-agency programs and functions. OMB's efforts under GPRA should assist Congress as it looks for opportunities to streamline and improve the effectiveness of the federal government.

STEP 2: MEASURE PERFORMANCE

GPRA requires executive agencies to develop annual plans with suitable performance measures to reinforce the connection between the long-term strategic goals outlined in their strategic plans and the day-to-day activities of their managers and staff. Measuring performance allows an organization to track its progress toward its goals and gives managers important information on which to base their organizational and management decisions. At a roader level, measuring R&D agencies' performance helps Congress to know the results of R&D investments and to effectively allocate budgets among competing programs.

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[7] Federal R&D Laboratories (GAO/RCED/NSIAD-96-78R, Feb. 29, 1996).

Science agencies, like other agencies, must guard against the understandable tendency to verly rely on goals and measures that are easily quantifiable, such as numbers of research grants provided and completed, at the expense of what is truly important but more difficult to neasure, such as the difference a research grant made. Organizations that measure and nanage on the basis of easily quantifiable goals rather than results run the risk of striving to chieve goals that may be only marginally related to the reasons the program was created. For example, we recently reviewed the short-term performance results and long-term valuation strategy of the Advanced Technology Program (ATP).[8] ATP is administered by he National Institute of Standards and Technology (NIST) within the Department of ommerce and has had its funding grow from $68 million in fiscal year 1993 to $431 million n fiscal year 1995, more than doubling each year.

NIST identified several evaluation measures that it expects will indicate the long-term conomic success of ATP projects. One NIST measure is "straightforward tracking of echnical milestones." However, we found that achieving technical milestones may not be a valid indicator of the economic success of ATP projects because achieving technical milestones does not always lead to economic success. For example, earlier versions of the ATP valuation plan pointed to one ATP project that was achieving all of its technical milestones s evidence of the project's likely success in stimulating economic growth. However, the lead company involved in this joint venture went bankrupt before the project was completed. Although the other company in the joint venture has stated its intention to continue the joint venture commercialization plan, the lead company's bankruptcy reduces the likelihood of future economic benefits being realized from this ATP project.

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[8] See Performance Measurement: Efforts to Evaluate the Advanced Technology Program (GAO/RCED-95-68, May 15, 1995).

The Challenge to Measuring Science Programs' Outcomes

The tendency to focus on what is relatively easy to measure may be particularly strong for science agencies because the selection and use of performance measures have presented a longstanding challenge for such agencies, especially for those that support fundamental scientific research.[9] In particular, assessing the outcomes of science-related projects can be extremely difficult because a wide range of factors determine if and how a particular R&D project will result in commercial or other benefits. It can take many years between when a research project is undertaken and when the outcome occurs. For example, the National Institutes of Health and other federal institutions support research at universities by investing in (1) the development of principal investigators, who work at the forefront of scientific and engineering research and (2) the training of new PhDs and other professionals. Hence, these people are "products" of the research projects the agencies support. However, the outcomes--in terms of scientific contributions--produced by these individuals as a result of the federal agencies' investments in their development and training frequently extend well beyond a specific federally funded research project and can be exceedingly difficult to measure.

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[9] Assessing the Output of Federal Commercially Directed R&D (GAO/PAD-79-69 Aug. 27, 1979).

)etermining the specific outcomes resulting from federal R&D has been a challenge that will iot be easily resolved. Due to the difficulties in identifying outcomes, R&D agencies typically iave chosen to measure a variety of proxies for outcomes, such as the number of patents esulting from the federally funded research, expert review and judgments of the quality and mportance of research findings, the number of project-related publications or citations, and ontributions to expanding the number of research scientists.

'o help address the challenges of measuring the results of R&D programs, the Research oundtable, a consortium of federal agency representatives, has been meeting periodically to hare ideas and approaches for implementing GPRA. The Roundtable has been considering he extent to which R&D agencies can and should adopt a common approach to measuring erformance. It is still too early to tell whether this group will define and recommend a ommon model to meet the performance requirements under GPRA. Nonetheless, the oundtable's efforts are promising in that they show that officials in science agencies ecognize the performance measurement challenges they confront and are working collectively o address those challenges. Congress can support the Roundtable's efforts by working with t to ensure that congressional data needs are met by any common performance measurement nodel that the Roundtable may recommend.

}PRA recognizes how difficult it is to state the goals and measure the results of some rograms. While the law encourages the use of objective measures of performance, it uthorizes agencies--with the approval of OMB--to use alternative, subjective measures of erformance. Congress expects that one form of alternative measurement will be to define he characteristics of a marginally effective program and a fully successful program and to assess progress against those definitions. NSF is seeking OMB approval to use an alternative format for articulating its performance goals under GPRA. This request, and any additional ones, to employ an alternative form of measurement may become an important indicator of the difficulty of fully achieving GPRA's design in science programs.

STEP 3: USE PERFORMANCE INFORMATION

As to be expected during the initial efforts of such a challenging management reform effort as GPRA, most agencies, including science agencies, are still struggling to integrate the mission-based goal-setting and performance measurement requirements of GPRA into their daily program operations. This integration is important because GPRA performance information is to be used to guide an array of congressional and executive branch decisions.

Consistent congressional interest at authorization, appropriation, budget, and oversight hearings on the status of an agency's GPRA efforts; the performance measures it is using; and how performance information is being used to make decisions will send an unmistakable message to agencies that Congress expects GPRA to be implemented as conscientiously as possible. Congressional hearings, such as the one the Committee is holding today, are one key to showing agencies that Congress is looking to use GPRA performance goals and information to help inform its decisions and that it expects agencies to do the same. Moreover, congressional engagement in the strategic planning efforts now under way in executive agencies provides an excellent opportunity to clarify agencies' missions and goals and ensure that the resulting performance information will meet congressional and other decisionmakers' needs.

In summary, if successfully implemented in the science agencies, GPRA should help the Committee make the difficult science policy and program decisions confronting the nation. It also will help science agencies manage their programs and provide Congress and the American people with better assurance that tax dollars are being wisely spent. But the changes in management and accountability envisioned by Congress in passing GPRA are not coming quickly or easily, particularly in science agencies. The continued support and interest of this Committee may well determine the degree to which GPRA is successfully implemented in those agencies.

RELATED GAO PRODUCTS

Executive Guide: Effectively Implementing the Government Performance and Results Act (GAO/GGD-96-118, June 1996).

Managing for Results: Achieving GPRA's Objectives Requires Strong Congressional Role (GAO/T-GGD-96-79, Mar. 6, 1996).

Federal R&D Laboratories (GAO/RCED/NSIAD-96-78R, Feb. 29, 1996).

GPRA Performance Reports (GAO/GGD-96-66R, Feb. 14, 1996).

Office of Management and Budget: Changes Resulting From the OMB 2000 Reorganization (GAO/GGD/AIMD-96-50, Dec. 29, 1995).

Department of Energy: A Framework For Restructuring DOE and Its Missions (GAO/RCED-95-197, Aug. 21, 1995).

Managing for Results: Status of the Government Performance and Results Act (GAO/T-GGD-95-193, June 27, 1995).

Department of Energy: Framework Is Needed to Reevaluate Its Role and Missions (GAO/T-RCED-95-232, June 21, 1995).

Managing for Results: Critical Actions for Measuring Performance (GAO/T-GGD/AIMD-95-187, June 20, 1995).

Government Reorganization: Issues and Principles (GAO/T-GGD/AIMD-95-166, May 17, 1995).

Performance Measurement: Efforts to Evaluate the Advanced Technology Program (GAO/RCED-95-68, May 5, 1996).

Managing for Results: Experiences Abroad Suggest Insights for Federal Management Reforms (GAO/GGD-95-120, May 2, 1995).

Department of Energy: Alternatives for Clearer Missions and Better Management at the National Laboratories (GAO/T-RCED-95-128, Mar. 9, 1995).

Department of Energy: Research and Agency Missions Need Reevaluation (GAO/T-RCED-95-105, Feb. 13, 1995).

Department of Energy: National Laboratories Need Mission Focus and More Effective Departmental Management (GAO/RCED-95-10, Jan. 27, 1995).

Department of Energy: Need to Reevaluate Its Role and Missions (GAO/T-RCED-95-85, Jan. 18, 1995).

DOE's National Laboratories: Adopting New Missions and Managing Effectively Pose Significant Challenges (GAO/T-RCED-94-113, Feb. 3, 1994).

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The CHAIRMAN. I look forward to hearing from the witnesses, and again thank you very much for being with us today.

With that, let me invite the first panel to begin testimony. We would ask you to limit your formal remarks before the Committee to five minutes so that we can go on with questioning and can move everybody through the hearing process.

The full text of your prepared remarks will be included in the record, and I ask unanimous consent that the witnesses' remarks do appear in the record at the appropriate point.

With that, let me begin by having Professor Zare begin with his testimony.

STATEMENT OF PROFESSOR RICHARD ZARE, DEPARTMENT OF CHEMISTRY, STANFORD UNIVERSITY

Professor ZARE. Mr. Chairman and Members of this Committee: thank you very much for inviting me to testify. I come before you to discuss with this Committee two reports pertinent to this hearing issued by the National Research Council's Commission on Physical Sciences, Mathematics, and Applications, a Commission I had the pleasure of chairing for a couple of years.

Here are these two reports I am talking about (indicating). These reports concern the use of quantitative measures to assess investments in fundamental research.

[Roll call bells are ringing.]

The CHAIRMAN. We are not under attack.

Professor ZARE. I wondered.

[Laughter.]

The CHAIRMAN. We are getting a call for a vote. I think what I will do is have you do your five minutes of testimony, and then we will break and run over and make the vote and come back.

I apologize for the interruption, but please go ahead.

Professor ZARE. Thank you.

These five metrics identified such things as demographics, support, productivity, adaptability, and quality.

The Commission's initial assumption was that each of these areas could be tracked and evaluated using data from a variety of government data bases and non-government data bases, and this tracking would create a statistical portrait of any given field which could then be combined with more qualitative peer review approach to assess a field status.

To test this idea and apply proposed metrics, the Commission examined their applicability to three different fields. They were mathematics, astronomy, and what is called atomic, molecular, and optical sciences.

Now of course, assessing the health of a field is not quite the same as assessing the effectiveness of some government research program, but they are close.

Moreover, I believe we learned in testing the health of field metrics, in doing that, an important heuristic can be applied to the GPRA process.

Our work produced a negative result. That is, we were unable to use reliably and with any confidence quantitative measures to assess the health of a field, whether we looked at demographics, productivity, quality, and so on.

Our work very much affirmed this Committee's own observation that. "Quantitative measures may not be feasible for basic research."

Certainly quantitative measures are important and useful, but only if their limitations in context are clearly understood, and only if they do not dominate qualitative measures made by those active in the field.

Absent that understanding, the terrible danger exists of letting numbers, their metrics, drive decisions and therefore the direction of a field.

As this Committee well knows, that danger may intensify with static or falling budgets—as program managers understandably want to demonstrate the strength of their programs and researchers to continue their work, support, and feeding of their students.

In considering how GPRA should be applied to the activities of the scientific community, I reached four conclusions that I would like to share with you:

One, assessment of performance is an important function and responsibility of government, and science is not and cannot be immune from that. The American public has every right to demand evidence that its resources are well used.

Two, such assessments are indeed feasible for fundamental science, but must rely on judgments of those who understand the field, complemented, where apt, by quantitative measures.

Three, by the same token dominant reliance on quantitative measures on numbers, however elegantly obtained, will at best distort assessments and more likely will prove destructive as research proposals and funding decisions are optimized for the measures rather than for the best and most exciting science.

And finally, four, performance measurements—assessments—must consider the needs of multiple customers. This situation is especially true for fundamental science.

Scientific research has become so vital to the American economy and so significant a part of the Federal budget that understanding its contributions to National needs of both government and industry is imperative. Performance assessments, if done with understanding and wisdom, can inform that understanding.

The question is how to do it right.

That of course is what we look forward to hearing more about.

Mr. Chairman and Members of this Committee, this concludes my formal testimony.

Thank you, again.

[The prepared statement of Professor Zare follows:]

Testimony by

Richard N. Zare

before the

Committee on Science

U.S. House of Representatives

Wednesday, July 10, 1996
2318 Rayburn House Office Building

Mr. Chairman and Members of this committee, my name is Richard N. Zare, and I am the Marguerite Blake Wilbur Professor Chemistry at Stanford University. I was this past May elected Chair of the National Science Board; however, I am representing today neither the National Science Board nor the National Science Foundation. Rather, I was asked to discuss with this Committee two reports pertinent to this hearing issued by the National Research Council Commission on Physical Sciences, Mathematics, and Applications -- a commission I had the pleasure of chairing during this period. These reports were *Quantitative Assessments of the Physical and Mathematical Sciences: A Summary of Lessons Learned*, and the proceedings of a workshop, entitled *Research Restructuring and Assessment: Can we Apply the Corporate Experience to Government Agencies?*

Before I summarize the saliency of these reports to this hearing, I do want to address the three key questions I understand underlie this hearing:

> What is meant by accountability in research?
> Why is accountability important?
> Who is accountable to whom?

As this committee well knows, there is no straightforward way to define "accountability in research." Defining it immediately forces the question of accountable to whom: the sponsoring agency, the Congress, this Committee, the scientific community, industry, the American public, the international research community, and others? And for each, one should ask who is accountable? The individual scientist? His or her home institution? The manager of the program funding the work? The director of the sponsoring agency?

Rather than continue in this analytical vein, let me offer some fundamental answers that while simple and even obvious also harbor widely shared truths -- truths that are at the heart of the very vigorous and successful research enterprise in the United States.

I believe that scientists doing research supported by public funds are accountable for assuring the highest quality of that research. Any compromise of that premise breaks an implicit compact with the American public, and its agents in the Executive and Congressional branches. The scientific community is accountable for setting the standards for quality, and it is accountable for applying them, doing so primarily through judgments by experts competent in the research being evaluated, in a process that is often called merit or peer review. The sponsoring agency is accountable for creating and managing a research program that is responsive to its missions and to national needs, for assuring that the program is carried out efficiently, responsively, and at the highest possible quality; and for creating mechanisms to assure these outcomes. Finally, the agency is accountable for judging the effectiveness of its programs; that is, to answer the question whether the purposes for which public funds are provided are in fact achieved.

The last issue of course brings us directly to the aims of this hearing and to a conundrum, well-stated in this Committee's Hearing Charter:

> Performance assessment may become a powerful tool in the management of [agency research] programs, particularly in an era of federal downsizing and the concomitant need to more productively allocate federal R&D investments. However, assessment techniques are in relatively early stages of development and only in their infancy for areas such as fundamental science. Further, the causal relationship between research outputs and their eventual outcome is very complex.
>
> Particularly for basic research, the primary goal is to produce new knowledge, with long-term and, frequently, unpredictable outcomes. Fundamental science often contributes to multiple societal goals....Interpretation and evaluation of research results may require specialized expertise. Indeed, quantitative measures may not be feasible for basic research.

That last point -- the use of quantitative measure to assess investments in fundamental research -- was indeed directly addressed in an effort undertaken by the NRC Commission on Physical Sciences, Mathematics, and Applications. The Commission set out to determine whether quantitative measures could be used to assess the "health" of fields, and agreed on five broad areas that it believed to be useful indicators of the health of a field. These five were:

1. *Demographics:* The success of a field in attracting and retaining high quality students and professionals, including women, minorities, and other underrepresented groups.
2. *Support:* The capability of a field to generate funding and other types of support for graduate programs, research activities, and equipment and facilities consistent with the requirements established by the community.
3. *Productivity:* The quantitative output of a field in terms of knowledge and educated professionals; the effectiveness of a field in setting priorities and optimizing the use of resources.
4. *Adaptability:* The demonstrated capability of a field to adjust to changes in scientific opportunities, levels of support, and national needs.
5. *Quality:* The quality of the research output of a field in terms of scientific knowledge, educated professionals, and the impact of the field on world science and society, as well as the ability of a field to increase the quality of scientists, teachers, and students in higher education.

The Commission's initial assumption was that each of these areas could be tracked and evaluated using data from a variety of government and nongovernment databases, thereby enabling creation of a statistical portrait of any given field, which could then be combined with a more qualitative, peer-review approach to assess a field's status. To test this assumption and its five proposed metrics, the Commission examined their applicability to three fields -- mathematics, astronomy, and atomic, molecular, and optical sciences.

Of course, assessing the health of a field is not quite commensurate with assessing the effectiveness of governmental research programs. But they're close, and I believe what we learned in testing "health-of-field" metrics offers important heuristics for applying the GPRA goals to federally funded research.

Our work produced a negative result. That is, we were unable to use reliably and with any confidence quantitative measures to assess the health of a field, whether we looked at demographics, productivity, quality, and so on. Our work very much affirmed this Committee's observation that "quantitative measures may not be feasible for basic research."

To elaborate from the Commission's report[1]:

> Credible, statistically-derived indicators can be used as diagnostic tools to help determine certain aspects of the state of a discipline, to identify strengths and weaknesses, and to augment the factual basis for the conclusions and recommendations arising out of the assessment....Nevertheless, because of the amorphous and rapidly changing nature of any given discipline, and because of the numerous difficulties involved in obtaining and using putatively relevant data, the Commission has concluded that a significantly increased or systematic use of quantitative measures is unlikely to significantly enhance either the credibility of usefulness of its assessments of the health or status of disciplines.

Certainly, quantitative measures are important and useful, but only if their limitations and context are clearly understood and only if they do not dominate qualitative measures; i.e., by wise and fair judgments by those active in the field. Absent that understanding, the terrible danger exists of letting numbers drive grant decisions and therefore the direction of a field. As this Committee well knows, that danger may intensify with static or falling budgets, as program managers understandably want to demonstrate the strength of their programs and researchers to continue their work and support their students. As I observed in my preface for the report on quantitative assessments of fields:

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[1] *Quantitative Assessments of the Physical and Mathematical Sciences: A Summary of Lessons Learned.* NRC Commission on Physical Sciences, Mathematics, and Applications. National Academy Press: Washington, DC, 1994.

> Whereas some indicators may be useful for judging the normal pace of progress in a field as it follows its established paradigm, no evidence could be found that suggests that such statistical measures have long-range predictive power. How can we know whether some supposedly dull field in stasis or even in decline is on the verge of a remarkable rebirth that will result from an unexpected experimental discovery or from some new and vital idea coming from the work of just one individual?
>
> We must not let a cycle be created in which the need for accountability leads to the use of measurement standards, which leads to polishing existing paradigms, which leads to further demands for accountability, and so on, with the effect that this cycle drives out investment in possible paradigm shifts. Put another way, we must avoid "looking for the lost key where the light is brightest": we must avoid allowing what can be measured to become what matters, rather than seeking to measure what matters-which frequently are attributes that cannot be quantified.

In a way, our report served as preamble to similar conclusions in the Congressionally mandated report on Allocating Federal Funds for Science and Technology.[2] The committee in commenting directly on the Government Performance Results Act noted that

> ....a clear message emerges from the abundant recent writing on applying performance measures to research and development: it is a complicated business. The science of metrics documents that most measures are incomplete, and mindless application actually can undermine the very functions such measures are intended to improve. Just as the tyranny of quarterly bottom lines can frustrate long-term corporate planning, so also can science be distorted by simple indicators such as publication counts, citation counts, patent counts, doctorates produced, or user satisfaction ratings. These are useful, but incomplete, measures. Several recent assessments of such measures concluded that they must be augmented by expert judgment. One review observed that such measures may leave out "virtually all of what researchers themselves find important about their work. One could have a government full of programs that performed beautifully according to these indicators, and still be at the trailing edge of every scientific frontier." It makes sense to track relevant measures, but they cannot supplant the essential element of expert judgment that is the bedrock of quality assessment in research and development.

Let me briefly offer corporate perspectives on fundamental research within a company. Whether these experiences offer lessons to government agencies in assessing their research investments, and the NSF's task in responding to GPRA in particular, was the aim of a workshop held in 1995 by the Commission, at the request of the National Science Foundation. Senior research officials from AT&T, Xerox, Ford, and IBM were asked to describe the restructuring of research work within their companies. Why it was done? To what purposes? What assessments, metrics and other means were used to judge both the need for restructuring and the outcome? What transpired in a very lively workshop is contained in a report by the Commission.[3] However, let me offer a few of the observations that come out of the meeting salient to this hearing, ably summarized at the Workshop by John Moore, former deputy director of the NSF.

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[2] *Allocating Federal Funds for Science and Technology*, National Academy of Sciences, National Academy of Engineering, Institute of Medicine, National Research Council. National Academy Press: Washington, D.C. 1995.

While each company used different approaches to assessing the need for research restructuring, none relied significantly on quantitative measures. Indeed, the general view was that what could be measured in research performance was likely to be trivial. Also, measure changes performance; that is, if people know how they are going to be assessed, they will change their behavior to optimize the measures. While such behavior modification has its pros and cons, history is not comforting. I believe the potential for misuse is very substantial, especially in possibly ceding control over the direction of the scientific enterprise from the knowledgeable scientists to an administrator or committee of administrators who may be quite able but not current on research opportunities for a given field.

Interestingly, the individual companies in restructuring their research efforts simply allocated a small percentage of the total budget to fundamental research, with that funding quite deliberately not linked to a particular corporate mission. That investment was seen as an ultimate good, in large measure because it provided the company with standing in frontier research fields. Also, many times during the workshop participants referred to looking at research performance from the "customer's point of view." On this point, Dr. Moore noted that "NSF has developed ways of discerning the wants of at least one group of customers, the scientific community and, perhaps, of industry and other constituents. But do these methods still work? Do they work well enough, and are they weighted correctly in NSF's considerations? Such questions again raise the issue of cultural change. How is the advice that comes in through NSF's academic advisory committees weighted compared to the advice that may come in from industry, from Congress, or from other groups?"

These views from the corporate community align remarkably well with those in the other reports I've cited, and are congruent with my own views on performance assessments

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[3] ***Research Restructuring and Assessment: Can We Apply the Corporate Experience to Government Agencies.*** **Report of a Workshop. NRC Commission on Physical Sciences, Mathematics, and Applications. National Academy Press: Washington, DC, 1995.**

1. Assessment of performance is an important function and responsibility of government, and science is not and cannot be immune from that. The American public has every right to demand evidence that its resources are well used.

2. Such assessments are indeed feasible for fundamental science, but must rely on judgments of those who understand the field, complemented where apt by quantitative measures.

3. By the same token, dominant reliance on quantitative measures -- on numbers however elegantly obtained -- will at best distort assessments and more likely will prove destructive as research proposals and funding decisions are optimized for the measures rather than for the best and most exciting science.

4. Performance assessments must consider the needs of multiple "customers." This situation is especially true for fundamental science. Scientific research has become so vital to the American economy and so significant a part of the federal budget that understanding its contributions to national needs, of both government and industry, is imperative. Performance assessments, if done with understanding and wisdom, can inform that understanding.

Mr. Chairman and Members of this Committee, this concludes my formal testimony. Thank you again for the opportunity to appear before you. I would, of course, be happy to respond to your questions.

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The CHAIRMAN. Thank you, very much.

[Bells again are ringing.]

The CHAIRMAN. Well, you hit it right on the nose of the second call for five minutes.

[Laughter.]

The CHAIRMAN. We will break now. My understanding is that we have a 15-minute vote followed by a 5-minute vote on the Journal. So we will catch those and then return immediately.

Again I thank you, and with that the hearing stands in recess.

[Brief recess.]

The CHAIRMAN. The hearing will come to order.

Dr. McGroddy, we will hear you next, please.

STATEMENT OF DR. JAMES C. McGRODDY, SENIOR VICE PRESIDENT AND SPECIAL ADVISOR TO THE CHAIRMAN, IBM CORPORATION

Dr. MCGRODDY. Thank you, Mr. Chairman.

My name is Jim McGroddy. I am a Senior Vice President of the IBM Corporation. I would like to thank this Committee for inviting me to testify in these important hearings.

The CHAIRMAN. Would you pull the microphone a little closer to you there?

Dr. MCGRODDY. It is not turned on, I think. I will just use the other one.

I would like to thank the Committee for inviting me to testify in these important hearings. I hope my discussion of IBM's approach to the assessments of its own research programs will assist the Committee as you consider how best to assess government-sponsored research and development.

There has been a long debate on the possibility and the effectiveness of applying management principles and processes to the research establishment.

Today I will discuss some of the systems used in industry, and in particular that which we use in IBM's research organization.

My own experience in this area results from managing in that organization beginning about 1969, and from 1989 until this year I was the head of that organization around the world.

In order to explain how we assess research in an industrial environment, I will cover the following topics:

First, I will provide you with some background on the nature of this research program.

Second, I will cover what I consider to be four basic principles that drive the assessment of our research programs. I strongly believe that no research program can be effectively assessed unless both the researchers themselves and the sponsoring organization, whether industry, government, or university, agree on a set of basic principles.

Third, I will cover IBM's assessment process, the means by which we annually reprioritize our research efforts in detail.

IBM research has a long record of major accomplishment and good recognition for that accomplishment among both the scientific and technical community. Technology is fundamental to the modern information age. Things like the disk drive, the memory chip, FORTRAN, reduced instruction set microprocessor technology, and many of the key fundamentals in modern silicon integrated circuit technology had their origins in IBM research.

The Nobel Prize in Physics has twice been awarded to discoveries made there, and the National Medal of Science and the National Medal of Technology have been awarded to 10 of our people, most recently in 1995.

IBM's research organization is in fact managed at quite a level of detail, and it is assessed. I think these achievements support the thesis that research organizations do in fact benefit from an appropriate level of management and assessment, and the strategic planning, project selection, project evaluation, and measurement of overall effectiveness do exist and can ensure the effectiveness of research investments.

Let me talk about the four principles that we use.

The starting point for understanding performance assessment is the first principle. Namely, that a research organization's goal must be to maximize the value it creates and delivers to its sponsor. That value must be defined in the sponsor's terms.

There must be clear goals which are debated and discussed broadly within the entire institution which then form a solid, yet dynamic base for assessment and agenda-setting.

Regarding government, the specific positions of the agencies and departments must obviously play a key role in determining what these goals are. Maximizing value affects both the resource allocation at macroscopic levels—for example, investment in on field versus another—as well as specific project selection and resource prioritization.

In this context it is particularly important to examine institutions and programs which have been created in earlier times, and to decide whether changed circumstances may have made them less relevant.

The second important principle is that it is essential to couple the research effort to its immediate beneficiaries. Partners must be closely linked. A major input in the assessment process must be the evaluation by the partner of the value created and delivered to the partner.

Today, nearly half of IBM's total research effort, which is funded at a total amount of a half a billion dollars, is operating in such a joint program mode.

This has been enormously effective in exploiting the results which you have achieved in products and in production.

The third principle is that it is probably not possible to have too much contact between people in the laboratories and the marketplace.

Today our research people, including many of those doing the most fundamental research, are in direct contact with customers in the marketplace.

This in fact can provide major stimulation to their work. The old view of researchers as monks isolated in hilltop monasteries, is clearly totally obsolete.

So far I have discussed most of the areas where the research efforts are well defined in terms of their impact. There are, however, important areas where research organizations play the role of explorer and pioneer in the industrial environment that is often without the strong support of those whose responsibility is next year's product.

Agenda-setting and assessment in these areas is different. Here we have developed a long-term outlook of the evolution of in-place and novel technologies in the marketplace potential, and we update this outlook annually, involve our partners across the company, and our customers in this effort.

We use this to drive our agenda selection. This drives change and often it produces conflict with other people's near-term goals.

The fourth principle is that the assessment process must drive change at a pace consistent with what is required. The hardest part of this is to stop doing good things in order to be able to fund what might be better. The bad work, in almost every case, has long since been driven out and the challenge is to stop good things.

There is more than a little guessing here, and it is absolutely essential that the guessing be done by a seasoned and technically deep management team.

Let me turn now to what is often referred to as fundamental or basic research. This is research in developing a basic understanding of nature in selected areas, and extending the scientific underpinnings of our technologies and our business.

This type of research provides tremendous value to IBM. First and foremost, investment at the leading edge often becomes the base for the advancement of technology.

Second, this long-range work is often a natural entry point for many of the best and brightest minds into our company.

Third, the lustre which a successful long-range scientific research program achieves provides value to the whole enterprise.

To achieve this value for IBM requires that the assessment and the agenda-setting processes in this area be consistent with these goals.

The assessment process must focus on encouraging adventurous efforts. The level of risk is higher, and the system must use indicators other than short-term results.

In our case we focus on identifying supporting people with the depth and the talent to achieve major breakthroughs, even if the path is a long one.

I think the long-term results that we have achieved justify this approach. Let me summarize the assessment process. It operates at several levels: at the level of the individual project; and at the level of the entire organization.

We establish clearly defined goals.

We focus on the creation and delivery of value to IBM.

Each year we go through a reprioritization process to allocate resources for the next year. Many good efforts are terminated or reduced to provide resources to enhance or start efforts in more promising areas. There is significant involvement of our partners in other parts of the company, and the final results are reviewed by our chairman.

For an overall retrospective assessment we rely on a research division contract with the parent company which defines the value we create and deliver and reflects this agreement that we have come to.

We rely mostly on input from our partners in the divisions regarding a level of achievement, using a structured partnership assessment which is semi-quantitative.

We also measure things like the actual number of patent applications, and whether we meet our financial commitments. We measure the recognition of our work and the recognition that our people achieve from their peers in the scientific community.

These inputs are largely external to the research organization and are used to track year-to-year trends. This annual assessment is reviewed at the top of the corporation and significantly affects the compensation of every individual in the organization.

We believe that this closed-loop assessment and agenda-setting process have in fact been quite effective. I believe that this methodology has direct applicability to and in fact is being applied in the government's institutions which either perform research or fund others to perform it.

I will be happy to answer any questions you might have. Thank you.

[The prepared statement of Dr. McGroddy follows:]

TESTIMONY OF JAMES C. MCGRODDY

SPECIAL ADVISOR TO THE CHAIRMAN,

SENIOR VICE PRESIDENT, IBM CORPORATION

COMMITTEE ON SCIENCE

U.S. HOUSE OF REPRESENTATIVES

JULY 10, 1996

The Research Establishment...
..Are Planning and Assessment Possible, Are They Useful ?

Thank you, Mr. Chairman.

My name is James C. McGroddy and I am senior vice president, IBM Corporation.

I'd like to thank the Committee for inviting me to testify in these important hearings and I hope that my discussion of IBM's approach to the assessment of its own research programs will assist the Committee in its critical oversight role of the Federal research agencies.

Long before the passage of the Government Performance and Review Act, and its application to the various agencies of the government which either perform or fund research, there has been a debate on the possibility and the potential impact, both positive and negative, of applying a set of management principles and processes to the research establishment. Much progress has been made in this area, and there are examples of systems which properly balance the freedom and flexibility often at the root of major advances with the discipline of a system which relates value created to investments made. My intent today is to discuss some of the systems used in industry, in particular with the system in use in IBM's Research organization. While many of the details of systems of planning and assessment used in industry are specific to particular industry environments, much of what has been learned can be, and much has been, translated into equivalent practice in the government sector.

In order to explain how we assess research in an industrial environment, I will cover the following topics:

First, I will provide you with some background on IBM's research program.

Second, I will cover what I consider to be the four basic principles that deal with assessment and priority setting of our overall research program. I believe strongly that no research program can be effectively assessed unless both the researchers themselves and their sponsoring organization -- whether industry, government or university -- agree on a set of basic principles.

Third, I will cover in somewhat more detail, IBM's assessment process -- the means by which we annually reprioritize our research programs. And I will illustrate this with examples of how we changed over the past few years.

I will also be glad to answer any questions you may have.

IBM Research Background

My own experience in this area results from involvement in the management of one of the world's premier research organizations for many years, beginning about 1969. I joined IBM Research in 1965 after completing a Ph.D. in Physics at the University of Maryland. Beginning in 1969 I have played a role in managing this organization through a period of dramatic advances in information systems technology, and corresponding and consequent significant changes in our business environment. Starting in 1977 I was responsible for our efforts in integrated circuit technology and the science and technology underlying these areas. From 1989 until January 1 of this year I was responsible for leading the entire research division, which currently comprises seven laboratories across the world, and about 3000 people in all. IBM Research is a proud and successful industrial research organization, with a long record of major accomplishment and recognition for that accomplishment. Technologies fundamental to the modern information age, such as the disk drive, the memory chip, FORTRAN, reduced instruction set microprocessor technology, and much of what is key to modern silicon technology had their origins in IBM Research. And we have been no less successful in contributing to the base of science....Physics, Materials Science, Computer Science and Mathematics which provides the underpinnings for this rapid technological progress. Advances such as High Temperature Superconductivity and the Scanning Tunneling Microscope, both discovered in IBM research laboratories, have been recognized with the Nobel Prize in Physics. The National Medal of Science has been awarded to four scientists from IBM Research, and the National Medal of Technology has been awarded to six of our people, most recently in 1995.

I recite this list of achievements to provide a key piece of background for supporting the thesis that research organizations and institutions do in fact benefit from an appropriate level of management, and that appropriate techniques for strategic planning, project selection, retrospective project evaluation, measurement of overall effectiveness do exist, and can be used to ensure and enhance the effectiveness of research investments in a dramatically changing world. There are those who claim, particularly for what they refer to as "basic" or "fundamental" research, either that measures of effectiveness and effective retrospective assessment either do not exist, or can only be applied with such a long time horizon that they in fact have no impact in changing the goals, agenda or operations of research institutions. Based on long experience, both in managing industrial research, and serving on advisory and visiting committees for a variety of government and academic institutions, I do not support this view.

While there are many aspects of the effective management of research investments which differ according to the nature and goals of the particular institution, I believe that there are some base principles which are quite general, and properly interpreted, are useful across a very broad spectrum of institutional settings. In what follows I will list some of these principles and describe briefly how they have been useful in driving change and enhanced effectiveness of the IBM research organization over the years. I am sure that the set of principles in neither complete nor universal in its applicability, having been derived from a particular set of experiences. However, I do think the principles are useful as an input to the implementation of what is required by the GPRA from the institutions of the government which either perform or support science and technology for the civilian sector.

Four Principles of Research Management

The starting point for understanding performance assessment, and the other processes essential to achieving a closed-loop process aimed at maximizing effectiveness in a dynamically changing environment, is the particular setting of the research organization and a broad set of goals agreed to by the sponsoring organization. In our case, IBM Research is embedded in the world's largest information technology company, and we have had for many years the broad and dual goal of being " Famous for Science and Technology, and Vital to IBM". The more general principle is that a research organization's goal must reflect a maximization of the Value it creates and delivers to its sponsor, with Value defined in the sponsor's terms. The definition of Value and what it means to maximize it, is very much dependent on the goals of the sponsor. The set of things which constitute Value for a university is quite different in detail from the set which is appropriate to a government laboratory or an industrial laboratory. Within the government there are also significant differences according to the mission of the agency or department, which must in the end be reflected in the agenda and the assessment of effectiveness of the agenda and its execution. In IBM we focus on six aspects or elements of value, some of which are quite quantitative, others less so. These elements are : 1. leadership technology in our products and service offerings; 2. a valuable patent portfolio which provides both royalty income and freedom of action; 3. providing strong and technically deep leaders to the other parts of our business; 4. building a long-range vision of the evolution of technology and our customers' exploitation of it, as a major input for corporate planning; 5. contribution to rapid solution of major technical problems wherever they occur, for example in manufacturing ; and 6. contributions to the image of IBM as a technical leader, and the exploitation of this image in marketing.

Before effective assessment can begin, a detailed understanding of what it means to maximize the creation and delivery of value, with value defined in the sponsor's terms, must be in place. It is incumbent on the people who do the research, and those who manage them , to devote the energy required to develop these clear goals, and to ensure that they are debated and discussed broadly within the institution and with the sponsoring organization so that they form a solid and stable, yet dynamic, base for assessment and agenda setting. In the case of the government it is clear that the agencies and departments, with their own specific missions, are charged by society with investing society's resources to achieve society's objectives. These specific missions must play a key role in the thinking that takes place in each of the research institutions and across the broader set of institutions, in the Congress and the Executive Branch.

This first principle, then, is that the research organization must set its goal as maximizing the Value it creates and delivers to the sponsor. And the organization itself must, because of the challenges associated with the complexity of research at the frontiers, itself devote significant energy to this thinking and to engaging with the sponsor to achieve agreement on these goals. An important corollary in a dynamically changing world is that it is important to recognize that what constitutes Value can change rapidly and radically, and that the appropriate goals of the research organization may be affected as a result. Hence it is important that the thinking on this subject, and the associated dialogue, be a continuous process.

Application of this principle of maximizing the value affects both the resource allocation at macroscopic levels, investment in one field or area of opportunity versus another, as well as specific project selection and resource prioritization. Having in place a clear set of principles was particularly important in IBM Research, as we managed our way through major agenda shifts and project reprioritization in the early 1990's at the same time that we were reducing our overall research investment by about 25% to get in balance with the economic realities of our industry. It is pretty evident that, unless one is in a period of growth, providing the resources required to begin or grow newly promising areas can only be accomplished by reducing and stopping efforts which, although valuable, and "good work", have become less valuable, which offer less promise for the future. Within any field of research there is always a growing set of open and interesting questions, and the dynamic of the field itself will always drive for growth and increased investment within the field. Maximizing the value created with a fixed investment, or deciding on the allocation of changes in investment, whether positive or negative, requires that judgments and prioritization take place to balance the natural forces at work within the individual disciplines. In this context it is particularly important to examine institutions and programs which have been created in earlier times, and decide whether changed circumstances have made them less relevant.

In the case of IBM Research this principle provided strong guidance in an industry where rapid change, much of which is the direct consequence of the success of IBM's and others' research teams' success, is the norm. The pace of change in the underlying technologies of our industry ..... microprocessor performance, memory chip and disk storage capacity, and communications bandwidth ..... is enormous, with the pace of advancement consistently about one hundred times per decade. At the time I joined IBM Research thirty years ago the research efforts were devoted almost completely to the science underlying our industry, and to long-lead-time technology efforts. As more players joined the industry, and as the large Japanese companies accelerated the pace of progress, particularly in silicon integrated circuits, we reexamined our programs in this area, and particularly the processes which we had in place to move the research advancements into development and production. At the end of the 1970's we made major changes in our agenda, and in our processes, aimed at speeding up the pace of our integrated circuit technology. Our efforts in this area increased significantly, and we put in place new structures to better couple the research efforts to the downstream objectives of the groups which developed the products. In these structures, which were jointly funded and staffed, research began to measure itself, and to be measured by the company, on this new set of market-based objectives. It is important to note that the initiative to make these changes came predominantly from the research organization as the result of the kind of thinking described above. This changed approach to our work aimed at accelerating the pace of progress in the mainstream technologies and products was soon applied across the full spectrum of these activities, and has been adopted by many other organizations.

Embedded in the above example is a second important principle, which is critical to effective assessment. This second principle is that effective coupling of the research effort to the organization which is its immediate beneficiary is essential. This coupling must include mechanisms for the benefiting organization's goals and needs to be well understood by the research organization, and to affect its agenda. A major input in the assessment process must be the evaluation by the partner of the value created and delivered to the partner. Too often one sees self-assessment as the only, or the primary, assessment of a research group.

Over time the portion of IBM Research which was operated in this "Joint Program" mode, with strong coupling of the research program to its downstream partners, grew to be about half of the total effort. This growth was motivated by the obvious success of this mechanism in accelerating the pace of progress in the marketplace.

By the end of the 1980's another important change was becoming evident, a change which demanded change in the interpretation of our goals, change in our agenda and in its assessment. This change was reflected in an increasing desire on the part of our customers to buy not just products, but solutions, the integration of hardware, software, consulting, and custom services .... aimed at helping them deal with the increasing role played by information technology in the competitiveness of their businesses. This area, solutions, had not been considered a target for research efforts, ours or anyone else's. Yet the goal of being "Vital to IBM" demanded that we explore whether we could be a factor in enabling IBM to satisfy this change in marketplace demand. Some customers told us, and told me directly, that their decisions on information technology spending, the choice of suppliers, was increasingly dominated by their perception of a particular supplier as a partner in solution creation and deployment. Much change was afoot in our company to deal with this change. Within Research we did an assessment of our achievement against our dual goal, and concluded that we would fail in being " Vital to IBM" if we were not to be a major contributor in this area. This assessment also revealed that less than 5% of our resources were devoted to this area. As a result of this assessment, we began a study, and some experimental programs, to determine what sort of agenda would be appropriate for research in this area. Many IBM customers were involved in these efforts. In 1992, having defined a number of areas where we believed we could be effective in creating solution value as a research organization, we committed to increase the resources devoted to " solution " research to 20% of our total by the end of 1995. In fact we achieved this goal by year-end 1994, a year ahead of plan. The implementation of this change caused significant pain in some parts of the organization, and required many people to shift the focus of their activities and to build new skills. The assessment of the effectiveness of this change, both within IBM and by our customers, has been very positive. Solution research has put our research people, including many of those doing the most "fundamental" research, into contact with customers and the marketplace, and has provided major stimulation to their work.

From the above experience I derive a third principle .... it is probably not possible to have too much contact between researchers and the marketplace. Researchers often have the solution to a problem of which they are not aware. In my view solutions without problems are as big a failure as problems without solutions. Since in our case the ultimate success is marketplace success, contact with the marketplace has a natural place in the spectrum of what research groups are about.

So far I have discussed mostly areas where the target of the research efforts is well-defined, and the results find a natural path to the marketplace through some other part of our company. There are however important areas where this is not true, and for these the agenda-setting process and assessment are somewhat different. Our industry is one which grows to a significant degree by the creation of new technologies and applications of technology. Here Research plays the role of explorer and pioneer, often without the strong support of those whose responsibility in next year's products. In addition, many things which are " the hot new thing" for research will in the end not succeed in the marketplace. How do we set the agenda, and how do we assess our success in such areas ? In IBM the Research organization has the responsibility to look ahead across a very broad front and to set in place probing efforts in various areas. As the base for this agenda-setting we have developed a long-term outlook which attempts to describe the trajectories of various in-place and novel technologies, and their potential exploitation in the marketplace . We update this outlook annually, and involve our partners across the company and our customers in this effort. This outlook points to many things where a research effort is in order, or where an existing one should be enhanced. It serves as the base for our agenda-setting process, which of necessity requires that we stop existing work, or reduce its scope, to fund new efforts. A major test of the effectiveness of an assessment and agenda-setting process is its ability to stop things, things which in many ways are " good" things, but things which must be stopped to start better things. An assessment process without impact on agenda and priorities is obviously a waste of effort. In IBM Research we use these processes to drive continuing change in our agenda. The processes involve them deeply, and are not done in isolation. In spite of this, it is clear that maximizing the value we create demands that we drive this change at a pace that is sometimes uncomfortable for the people doing the research. It is also evident that the retrospective assessment in these areas, where progress is not incremental, and where short-term forces may tend to drive out investment, must be longer term in its horizon. Without focus by the research organization on the creation of technologies which may displace in-place technologies, a company (or a nation) risks missing major new opportunity. As a recent example, it is clear that IBM's current success in parallel supercomputers may not have been possible without some years of earlier research investment in this technology. And in that earlier period there was not a high level of support from the product developers for this investment.

A fourth principle that is evident in the above is that the assessment process must drive change at a pace consistent with what is required. And in doing this the hardest part is to stop doing "good" things, in order to be able to fund what might be better. There is more than a little guessing here, and it is key that the guessing be done by a management team which is deeply involved and experienced in the relevant areas of research, which understands the goals of the sponsor as well as the downstream requirements for impact.

To complete the picture, let me turn to what is often referred to as "fundamental" or "basic" research ..... terms which I do not believe are particularly helpful in adding clarity. In our parsing of the subject, what I am referring to is research into the possibilities which nature offers, developing basic understanding of nature in selected areas, building and extending the scientific underpinnings of our business. This type of research, which is not usually coupled in a clear way with the advancement of technologies and products, is an essential element of our research efforts. It provides tremendous value to IBM, although often in ways that are not so direct and obvious as more tightly coupled work. And the understanding of the nature of this value is key to managing the people and the work in a way that maximizes the value created.

What is the motivation for IBM to invest in this kind of long term, highly exploratory work in science and potential technologies? How does it couple to the categories of value I listed earlier? The value comes in a number of forms. First and foremost, investment at the leading edge, and in unexplored areas, often allows nature to reveal new possibilities, which become the base for the advance of technology. Examples abound. Within IBM we have seen recent examples in the leverage of "giant magnetoresistance", a phenomenon discovered and understood as part of our scientific efforts, as the key to the next generation of disk drives. The scanning tunneling microscope, which earned its discoverers the Nobel Prize in physics in 1986, has since become a key element of the metrology needed to continue the progress in memory chips. Being the source of the science, and having this work in the same organization which focuses on leading edge technology, produces invention and patents of enormous value. A second value produced from these efforts is that this long range work is often a natural entry point for many of the best and brightest minds into our company. Over time, for a significant number of these people, interests shift, and they move into more applied work, into technology, into senior management positions. In our environment these shifts are legitimized and encouraged. Today several people who joined IBM Research to do very long range research are to be found as senior managers of multi-billion-dollar businesses and as vice presidents and senior vice presidents of the corporation. The Ford Motor Corporation has had a program encouraging similar motion for a number of years and achieved similar results.

A third form of value created by a successful long range scientific research program is the luster which it achieves, and the value of that luster to the whole enterprise. This luster has value not only in affecting how customers and the public think of IBM, its image, but also in much more practical ways such as the recruiting of top talent, who want to be associated with a recognized and successful team.

To achieve these three forms of value for IBM, which are above and beyond the value created for society by extending the boundaries of the known, requires that the assessment and agenda setting processes be consistent with these goals. The people who are capable of doing this kind of creative work at the forefront are largely self-motivated and self-directed, and that is as it should be. There are, however, strong external forces at work, which have a major effect on their choices. It is in balancing the effects of these external forces that an assessment process can be most effective.

Left to their own, and unaware of the goals and objectives specific to their environment, many scientists will be influenced in a major way by their peers. This can lead to a positive feedback effect, in which "hot" fields attract an increasing number of participants, and increasing support through the peer review system. More professors are supported, and produce more graduate students, who become professors. In our environment, where real breakthroughs, rather than incremental progress, are key to the achievement of value, it is essential that the assessment process focus on encouraging adventurous efforts, the exploration of uncharted areas. The level of risk .... risk that little is found of value for long periods .... is higher, and thus the system must use indicators other than short term results. In our case, besides the nature of the work which people propose, we focus on identifying and supporting people with the depth, talent and tenacity to increase the likelihood of achieving major breakthroughs even if the path is a long one. It is clear to us that this approach has paid off handsomely over the long run, and this is the approach we will continue to take. A corollary is that we actively discourage work of an incremental nature in established fields. We do this even where the individual, or others in our organization, are the leaders in the field, or the ones who initially established it some years before.

IBM Research Assessment Process

Let me summarize our assessment process*. It operates at several levels .... at the level of the individual project, and at the level of the entire organization. Our project assessment is done in the context of clearly defined overarching goals, which are translated by the researchers into terms appropriate for the particular project. This is focused on the creation and delivery of value to IBM, which pays the bills. Value has many aspects, but these are clearly defined and understood in terms of our overall goals and the nature of IBM's business. In the Fall of each year we go through a reprioritization process to allocate resources for the next year. This prioritization is based on both previous accomplishment in a particular area and the promise offered by a proposed plan of action for the year to come. In the course of this prioritization many good efforts are terminated or reduced in scope, in order to provide the resources to enhance or start efforts in more promising areas. There is significant involvement of our partners in other parts of our company in this process, and the final results are reviewed by our Chairman. Assessment at the individual level is closely tied to project assessment.

For the overall retrospective assessment, we rely on a Research division "contract" with the parent corporation, which defines the methodology for measuring the value we create and deliver in a number of areas. This contract is tied to the description of Value given earlier. For the specific projects which are jointly supported by our partners in other divisions, we rely on structured input from them on the level of achievement. For work which is longer range, we have in place a process involving both internal and external peer, assessment of the impact the work has had in its field. To reflect the importance of effective partnerships across the company we use a "Partnership Assessment" with essentially every part of IBM, which is our major customer of the Research organization. We measure the number and estimated value of the patents we have applied for each year. We are assessed in whether we meet our financial commitments. And finally, we have a measurement of the level of recognition our work and our people have received. As far as is possible, the inputs to these assessments are external to the research organization, and the results are at least semi-quantitative, so that year-to-year trends can be detected. The results of this annual overall assessment are reviewed at the top of the corporation, and form the basis for the variable portion of the annual compensation of every individual in the organization.

We believe that this closed-loop assessment and agenda setting process has been quite effective in helping IBM Research to sustain and increase its effectiveness in a rapidly changing environment. And I believe that much of what we are using in an industry setting has direct applicability to, and is being applied in, the government institutions which either perform research or fund others to perform it. While change is often a cause of discomfort, and change in advance of the obvious necessity for change is often questioned, I am convinced that processes such as those we have been using, based on a set of durable principles and grounded in the mission of the organization, can be used to provide the headlights into the future and the ability to steer around the sharp curves ahead to sustain a healthy science and technology research establishment in an increasingly fast-paced world.

* A more detailed review of this process can be found in " Research Restructuring and Assessment - Can We Apply the Corporate Experience to Government Agencies ? " , a report of an NRC workshop .... published by the National Academy Press, 1995.

The CHAIRMAN. Thank you, Dr. McGroddy. That was very helpful and I think it is a good addition to what we are doing.

Dr. Moniz, we will have your testimony next.

STATEMENT OF DR. ERNEST MONIZ, ASSOCIATE DIRECTOR FOR SCIENCE, OFFICE OF SCIENCE & TECHNOLOGY POLICY, THE WHITE HOUSE

Dr. MONIZ. Mr. Chairman, Members of the Committee, I am very pleased to be here today to discuss fundamental science assessment within the GPRA framework.

Accountability to the American public is essential for sustaining commitment to Federal expenditures across the entire range of government-supported programs.

This is especially so for investments such as those in fundamental science where the contribution to overarching national goals of prosperity, health, security, and environmental stewardship may be both very far in the future and intertwined with the broad set of program and policy developments and private sector initiatives.

Yet, there is no serious doubt that the basic research enterprise as a concomitant educational function must be sustained at world-class levels.

Thus it is incumbent on the Congress and the Administration jointly to frame measures which assure the needed levels of accountability while respecting the modes of inquiry necessary for frontier, basic research.

GPRA tools must be developed appropriately for the myriad of activities under consideration. This is recognized of course in GPRA itself.

Today I will discuss a recent activity involving many agencies summarized in this report provided yesterday to the Committee aimed at laying a common foundation for assessing fundamental science programs.

These programs, for reasons discussed above, may present some of the greatest challenges for meaningful implementation of GPRA.

Some of the most significant outcomes, such as creation of whole new industries that profoundly affect our lives, by definition cannot be expected in advance. Since such outcomes themselves are unknown for many years, quantitative assessment matrices tied to these outcomes cannot be very useful for prospective program management.

This is not to suggest that some elements of the basic research enterprise cannot be evaluated in a fairly straightforward way—and examples are given in my written testimony.

However, the central purpose for basic research support is development of new knowledge about the natural world and about human nature, human behavior and organization, for this is immediately clear that the flexibility built into GPRA by the Congress is essential for developing a meaningful system. That a combination of qualitative and quantitative measures is needed; and that the phasing-in period would be important for evolving the system to meet Administration and Congressional needs.

It is also clear that basic research programs spanning many agencies complement each other in making up the balanced Federal portfolio and should be viewed from a common perspective.

Thus, the NIST has worked to establish common principles for assessment of fundamental science programs, recognizing that these too will evolve with discussion and experience.

We stress that the activities that we took part in did not extend to the entire R&D enterprise, since a large fraction of that budget is targeted at developing rather near-term, specific contributions to agency missions.

The central issue in our view in assessing fundamental science lies in defining the goal against which progress is measured. As recognized and stated already, science drives progress towards overarching national goals over a long time period, and it is part of a larger enterprise requiring a complex interplay of science and technological innovation, together with policies that nurture the needed business and regulatory environment.

Thus the assessment process for government stewardship of science in the national interest requires an enabling or an intermediate goal whose attainment assures the necessary knowledge and human resource foundation.

The NIST says that goal is leadership across the frontiers of scientific knowledge. The motivation for establishing this goal is rather pragmatic. Broad scientific leadership has served the Nation exceptionally well for a long time.

Over that time, the expression of science and technologies has underpinned the national security, economic growth, environmental protection, and the treatment and eradication of disease, in addition to the inspiration provided to the public by many spectacular breakthroughs.

Economic analyses confirm the large social rate of return, and indeed retrospective evaluation over several decades of this type will be needed to have periodic updating to sustain this link between science and overarching national goals.

For prospective determination of the Federal basic research portfolio, merit review based on peer evaluation must remain the primary vehicle for assessment the instruments and conduct of science at the cutting edge.

Although qualitative in nature and time-intensive in practice, such review remains easily our best guarantee that we are competitively supporting research across the knowledge frontier.

The agencies will continue to implement the process with variations based upon program specifics, but the common theme is reliance on the scientific community and on competition.

It may be worth noting here in fact that, although many of the most stunning contributions in fundamental science to society's progress are unexpected, the progress of science itself results largely from a systematic assault on the leading questions in and across disciplines.

Science does not advance through a random walk. Each step forward is enabled by the accumulated knowledge resource, with the occasional punctuation by discoveries which profoundly change our views or open new fields. But it is the steady progress at the frontier and the planning that goes into it that permits a meaningful program management and system for assessing that program.

The agencies will clearly tailor their full GPRA assessment approach to their programs, including their mix of quantitative and qualitative indicators.

The SDC Report offers a set of assessment principles for fundamental science programs, and those are summarized in the report and in the testimony.

In addition, the agencies will incorporate subsidiary goals into their indicators. These will vary widely for specific agency programs, and some of these will be reported on in the next panel.

The NFDC report provides only the skeleton for the fundamental science, with the agencies responsible for fleshing it out as appropriate.

The framework provided in our report we hope will help eventually certainly in aggregating the results from different agencies toward improved management of the overall Federal portfolio.

Two additional issues deserve very brief comment:

One is that the goal of leadership across the scientific frontier suggests some level of international comparison. We simply stress that there is no intention here of implementing simplistic numerical ranking of national programs.

Our national interest rests in leadership, and leadership rests in our having our research and educational programs perform at the cutting edge, sometimes in competition, but often in explicit collaboration with scientists from other nations.

NFDC will return to the issue of such comparisons in the cross-agency context and simply note that others like the NRC are certainly very interested in this issue.

Another issue is that of planning, long-range planning. This is in many ways the heart of GPRA, providing the agency goals and objectives.

The fundamental science parts of the agency plans, however, need to be integrated into the overall agency plan. Consequently, the CFS of the NSTC has had all reports from the status of these plans for several agencies, but will not attempt to address cross-agency coordination.

Nevertheless, the ongoing activities of the CFS are effective in linking the program managers in communication and coordination as are important for maximizing the Federal investment.

In concluding, I will just draw on one example from my own research field of nuclear physics to exemplify how this communication and coordination can go forward.

The nuclear science effort is supported by two agencies, DOE and NSF, with however very asymmetric budgets. But the budget asymmetry disguises a critical interdependence with DOE for example building and operating large user facilities, with NSF supporting a large fraction—about half—of the university users.

So in this case the agencies work together, and with the community, to develop a single plan, the long-range plan of NSAC, a copy of which I have here with me.

That integrated plan for nuclear science then provides a program level building block for the NSF and DOE overall plans, plans that reflect the different agency missions.

Assessment of the nuclear science programs through peer review and other indicators, as discussed above, can then be carried out at each agency within the long-range plan framework.

This is only one example, but it is the kind of planning also inherent in the GPRA process which will have to lead to a bottom-up system providing the goals and objectives which then will be assessed in the context of world leadership.

So in summary, we look forward to working with the Congress in developing further the assessment of fundamental science programs, and I thank you again for the opportunity to discuss this with you today.

[The prepared statement of Dr. Moniz follows:]

Testimony of

Dr. Ernest J. Moniz
Associate Director for Science
Office of Science and Technology Policy

before
The Committee on Science
U.S. House of Representatives

on the subject of
Civilian Science Agencies' Implementation of the
Government Performance and Results Act

July 10, 1996

Mr. Chairman and members of the Committee, I am pleased to appear before you today to discuss the assessment of fundamental science within the framework of the Government Performance and Results Act. Accountability to the American public is essential for sustaining commitment to Federal expenditures across the entire range of government-supported programs. This is especially so for investments such as those in fundamental science, where the contribution to overarching national goals of prosperity, health, security, and environmental stewardship may be both very far in the future and intertwined with a broad set of program and policy developments (e.g., technological innovation; fiscal, regulatory, intellectual property, and trade policies; . . .). Yet there is no serious doubt that the basic research enterprise and its concomitant educational function must be sustained at world-class levels as the foundation for effective pursuit of national goals in a knowledge-based society. This has been eloquently stated in recent months by corporate leaders and governors, among others. Thus, it is incumbent on the Congress and the Administration jointly to frame measures which assure the necessary levels of accountability while respecting the modes of creative inquiry necessary for frontier research.

The public clearly is supportive of Federal research and development (R&D) investments and specifically of those in fundamental science, that is, research which has the primary goal of advancing our understanding of how nature works. The public links these investments very directly with government stewardship of our collective future and takes a pragmatic view in sustaining its support: government officials in both Congress and Administration must provide effective oversight by supporting programs that advance knowledge in scientifically significant directions and that are carried out efficiently. The Government Performance and Results Act (GPRA) is designed to stimulate development of the needed planning and assessment tools for both Congress and the Administration to improve accountability and performance budgeting. However, as recognized by GPRA, these tools must be developed appropriately for the myriad activities under consideration.

Today, I will discuss a recent interagency activity aimed at laying a common foundation for assessing fundamental science programs. These programs, for the reasons discussed above, may present some of the greatest challenges for meaningful implementation of GPRA. Some of the most significant outcomes, such as the creation of whole new industries that profoundly affect our lives (e.g., the electronics industry based upon quantum mechanics and the transistor, or the biotechnology industry based on the discovery of DNA and its function), by definition cannot be anticipated; since such outcomes are themselves unknown for many years, quantitative assessment metrics cannot be very useful. This is not to suggest that some elements of the basic research enterprise cannot be evaluated in a fairly straightforward way. For example, the American system of focusing basic research at colleges and universities supports training of the finest scientists and engineers. Advanced education is then an immediate benefit of basic research support and is continually assessed. Other pieces of the basic research enterprise that are program and agency specific lend themselves nicely to straightforward measurement. For example, the Department of Energy (DOE) operates numerous large user facilities (particle accelerators, synchrotron light sources, neutron facilities, . . .) to serve the scientific needs of many thousands of university and industrial researchers, as well as its own specific mission needs. Clear measures of performance evaluation are available for both construction (on budget, on schedule, on specification) and operation (operating time, beam quality, user support). Such measures will obviously be part of program-specific responses to GPRA. However, the central purpose for basic research support is development of new knowledge about the natural world and about human behavior and organization. For this, it is immediately clear that the flexibility built into GPRA by the Congress is essential for developing a meaningful assessment system, that a combination of qualitative and quantitative measures is needed, and that the phasing-in period will be important for evolving the system to meet Administration and Congressional needs. It is also clear that the basic research programs spanning many agencies complement each other in making up the balanced Federal portfolio and should be viewed from a common perspective. Thus, the National Science and Technology Council (NSTC) has worked to establish common principles for assessment of fundamental science programs, recognizing that these too will evolve with discussion and experience. We stress that the activity does not extend to the entire R&D enterprise, since a significant fraction of that budget is targeted at developing rather near-term, specific contributions to an agency mission.

The NSTC activity was carried out through its Committee on Fundamental Science (CFS), which is co-chaired by Neal Lane (Director, National Science Foundation (NSF)), Harold Varmus (Director, National Institutes of Health (NIH)), and myself. The Subcommittee on Research, chaired by Ruth Kirschstein (Deputy Director, NIH) and Anne Petersen (Deputy Director, NSF), had principal responsibility for drafting the report. The Executive Summary of "Assessing Fundamental Science" is attached. The full report is available on request or electronically at http://www2.whitehouse.gov/WH/EOP/OSTP/html/OSTP_Home.html.

The central issue in assessing fundamental science lies in defining the goal against which progress is measured. Only in rare circumstances is a fundamental science activity supported and pursued with a specific societal application anticipated over a short time independent of other developments. Rather, as widely recognized and already stated, science drives progress towards overarching national goals over a long time period and as part of a larger enterprise requiring a complex interplay of science and technological innovation together with policies that nurture the needed business and regulatory environment. Thus, the assessment process for government stewardship of science in the national interest requires an enabling or intermediate goal whose attainment assures the knowledge and human resource foundation necessary for improved health and environment, national security, economic prosperity, and quality of life. The NSTC identifies that goal as leadership across the frontiers of scientific knowledge.

The motivation for establishing this goal is rather pragmatic. Broad scientific leadership has served the nation exceptionally well for a long time. Over that time, the expression of science in technology has underpinned national security, economic growth, environmental protection, and the treatment and eradication of disease, in addition to the inspiration provided to the public by the many spectacular breakthroughs in understanding the world about us. Numerous economic analyses confirm the extraordinary social rate of return on investment in leading-edge science. Clearly, retrospective evaluation over several decades will need to be updated periodically to examine the link between science and the overarching national goals. For example, the Council of Economic Advisors examined economic growth in this context last year.

For prospective determination of the Federal basic research portfolio, merit review based on peer evaluation must remain the primary vehicle for assessing the excellence and conduct of science at the cutting edge. Although qualitative in nature and time intensive in practice, such review remains easily our best guarantee that we are competitively supporting research across the knowledge frontier. The agencies will continue to implement the process with variations based upon the program specifics, but the common theme is reliance on the scientific community and on competition. It may be worth noting here that, although the most stunning contributions of fundamental science to societal progress are usually unexpected, the progress of science itself results largely from a systematic assault on the leading scientific questions in and across disciplines. Each step forward is enabled by the accumulated knowledge resource, with the occasional punctuation by discoveries which profoundly change our views or open new fields. It is the steady progress at the frontier, and the planning that goes into it, that permits a meaningful program management and assessment system.

The agencies will clearly tailor their full GPRA assessment approach to their programs, including a mix of quantitative and qualitative indicators. To help with consistency, the NSTC report offers a set of assessment principles for fundamental science programs:

- Begin with a clearly defined statement of program goals.
- Develop criteria intended to sustain and advance the excellence and responsiveness of the research system.
- Establish performance indicators that are useful to managers and encourage risk taking.
- Avoid assessments that would be inordinately burdensome or costly or that would create incentives that are counter productive.
- Incorporate merit review and peer evaluation of program performance.
- Use multiple sources and types of evidence; for example, a mix of quantitative and

qualitative indicators and narrative text.

- Experiment in order to develop an effective set of assessment tools.
- Produce assessment reports that will inform future policy development and subsequent refinement of program plans.
- Communicate results to the public and elected representatives.

In addition, the agencies will incorporate subsidiary goals into their assessment indicators. The appropriateness of such subsidiary goals, such as education and training, contributions to public literacy, or stimulation of advanced technologies, will vary widely for specific agency programs. The NSTC report provides only the skeleton for assessing fundamental science, with the agencies responsible for fleshing it out as appropriate. Continued evolution will be needed. The framework outlined in "Assessing Fundamental Science" should help in eventually aggregating the assessment results towards improved management of the Federal fundamental science portfolio.

Two additional issues deserve comment. The goal of leadership across the scientific frontiers suggests some level of international comparison. However, we stress that there is no intention here of implementing simplistic numerical ranking of national programs. Our national interest in leadership rests in having our research and educational programs perform at the cutting edge — sometimes in competition, but often in explicit collaboration, with scientists from other nations. Our interest is in creating new knowledge, in having the most capable scientists and engineers, and in being poised to capitalize on scientific advances anywhere. Methods for international comparison will need to be developed over the next years for NSTC assessment of overall United States science leadership. We note that several organizations, such as the National Research Council, have discussed the issue.

Another issue is that of strategic planning. This is in many ways the heart of GPRA, providing the agency goals and objectives. The fundamental science parts of the agency plans clearly need to be integrated into the overall agency plan. Consequently, the CFS has had oral reports on the status of these plans from several agencies, but will not attempt to address cross-agency coordination. However, the ongoing CFS activities are effective in linking the program managers with responsibilities for implementing complementary parts of the fundamental science portfolio. Such communication and coordination will be increasingly important for maximizing the return on the Federal investment.

I will draw upon my own research field, nuclear physics, to exemplify the needed communication and coordination. The nuclear science effort is supported almost entirely by DOE and NSF with the former providing an order of magnitude larger budget. However, the budget asymmetry disguises a critical interdependence arising from different agency missions: while DOE builds and operates large user facilities at national laboratories, NSF supports a large fraction of the university users of those facilities. In this case, the agencies work together and with the research community to develop a single strategic plan for the discipline, the Long Range Plan of the Nuclear Science Advisory Committee (NSAC). That integrated plan for nuclear science then provides a program-level building block for the NSF and DOE overall agency plans, plans that reflect the very different agency missions. Assessment of the nuclear science programs, through peer review and other indicators, can then be carried out at each agency within the Long Range Plan framework. This is but one example, at the level of a scientific discipline, of the planning process which facilitates both sustained leadership and a sound basis for program assessment. GPRA clearly recognizes the importance of such strategic planning in shaping the shared commitment of the government, the public, and the scientific community towards optimizing our research investment and sustaining leadership.

In summary, we look forward to working with the Congress in developing further the assessment of fundamental science programs. The improved accountability inherent in GPRA should help sustain the public's commitment to world-class science in the national interest.

The CHAIRMAN. Again, thank you very much.

I think all three of you have given us a very good general overview.

Let me proceed now with some questions, and then I will go to Members of the Committee as well.

First a kind of general question to all three of you.

How does one assess the marginal benefit of investing incremental in an existing field of science versus investing in a fundamentally new but less predictable scientific endeavor?

It seems to me that, in this kind of process, that becomes one hell of a choice. And I would just like to get your reaction to that.

Professor Zare, do you want to start with that?

Professor ZARE. I think Dr. McGroddy's testimony again put this very well in that we are really facing problems of when do we stop the good to take a chance on something that may be better, but which may also flop?

And how do we particularly look at emerging areas?

Indeed now, if I might, putting on my hat with the National Science Board, we face those problems and we try to meet them by indeed a system that is very organized in which ideas are put forward and discussed by knowledgeable committees and so forth to recommend it.

But there is always the danger in this, no matter what group you draw, that they tend to only focus on that which they know and it is hard for them to reach out of the box. So your question is a very good one, and it is an ongoing process to try to answer it each year.

The CHAIRMAN. And as we build the knowledge base, I assume that there are going to be more areas where we are probably going to have to reach outside the box if we are going to stay ahead on the knowledge frontier, is the problem.

Professor ZARE. Right.

Dr. MCGRODDY. You are on a very important point, because natural forces all drive toward more investment in a particular field.

I mean, as the mathematicians would say, the interesting set of questions in any field is everywhere dense——

[Laughter.]

Dr. MCGRODDY. Because there are always more, and the dynamic of professors being supported, creating graduate students who will become professors who want support for theirs, drives in exactly that direction.

So I think the important thing to do is to recognize that there are natural forces at work; that there is a journal for this subject; that there is a meeting; that all those things are happening and have in place a balanced set of counterforces that force some pressure in the opposite direction.

Within IBM what we do is we, with a fixed budget—when I ran the Research Division—we always insisted on bringing forward proposals for new things which we knew at the outset we could not fund, and use that as a way to balance them against the things that were in place.

And it has in many cases produced spectacular results. In high-temperature superconductivity one of the elements in that was to get a fellow, Alex Mueller who won the Nobel Prize for that, to stop his work for 25 years on strontium titanate and look in a field where, you know, you were not picking up small flakes of incremental gold, but you might find a big nugget. And that is what he did.

The CHAIRMAN. Interesting.

Dr. Moniz?

Dr. MONIZ. The system today is less than perfect, I think we can agree upon.

I think first of all one of the essential aspects of being able to grapple with the problem you raise, Mr. Chairman, is the planning piece of GPRA. Again, reports such as these but multiplied over many fields.

Because I think these, first of all, define, first of all, some of those tradeoffs within a discipline. Prioritization in these community plans does lead to the closure of things, for example, and the start of new initiatives.

Secondly, it defines in some sense the marginal benefit in different fields which will have to be compared.

Now how those get implemented of course in the Federal Government is the next issue.

First I think that, building on this one example in the energy research program at DOE, which is one of the customers of this report, one of the two customers—well, plus the Congress—they have similar studies in the many different programs, and then of course within the agency they are making those tradeoffs in terms of where the marginal resources would go in terms of the various ER programs.

Then, at the Federal aggregate level at the NSTC, I would say that a critical period comes in the time period in which agency guidance is provided for priorities in forming the next year's budget. Because in that priority set there will be some new initiatives outlined for funding.

That will partly at least address the issue of where resources go, and then where the incremental cuts are made of course tends to happen in a more distributive fashion.

The CHAIRMAN. Dr. McGroddy, it seems to me that the commonalities and differences between the industrial model and the Federal R&D model may be one of the things that we have to work through here.

I think you have given us a very, very good presentation in terms of the assessment model used at IBM, and I found it extremely useful when I read through your testimony.

But the fact is, you do at the end know what your products are coming out of IBM. That, it would seem to me, would help focus the industry somewhat better than the Federal Government is going to be able to define its focus.

Would you agree with that?

Dr. MCGRODDY. Well I think what you say is partly true, but it is not quite that simple.

Our industry is one that grows by the creation of new things. For example, flat-panel displays were not here 5 or 10 years ago. Work stations were not here 15 years ago.

So one of the obligations that the research organization has is to proceed with investigatory programs—and in some cases we will go in fact as far as creating a new company to create these new technologies because the natural instincts of the rest of the organization are. This is new; it is flaky; it is risky; in fact, maybe it is a threat.

So it is not quite that simple.

I think that the principles at a high level are applicable. I am on the Visiting Committee for Advanced Technology at NIST, so I have a reasonable level of experience there, and have worked with other government organizations, and I have been on an advisory committee at Stanford where Professor Zare is, for many, many years.

I think at the high level the principles work, but what is important is to set what "value" means in the context of the organization, and who is paying for the organization, and to have that work done—the development of what "value" means, fairly specifically—to have it done by the researchers themselves and their managers, because it requires deep insight and intuition, and one needs to know when one is playing poker and not chess.

But then to have that debated and agreed to as a platform to do the assessment, which has, as we have all said, a quantitative part and a qualitative part.

The CHAIRMAN. I think that is useful. One of the problems I think we often have here in Congress is we are often trying to play poker—or chess with a poker hand, or something.

[Laughter.]

Dr. MCGRODDY. The difference in poker is you only have two cards and you do not know what is to come, and you have to do something; otherwise, you are out the hand.

The CHAIRMAN. That is exactly right.

Mr. Roemer?

Mr. ROEMER. Thank you, Mr. Chairman.

I guess I will try to follow up on that line of questioning there and try to follow up by saying we all want to know whether we are playing checkers or chicken or any kind of, you know, in between there.

I guess I would follow up on Mr. Walker's line of questioning to say that in the Office of Science and Technology Policy, they have established some very broad guidelines.

One of them reads, and I quote:

"Leadership across the frontiers of scientific knowledge."

I am not sure anybody would disagree with trying to set that as a goal. But how do you then translate that into something tangible for program managers?

Dr. MCGRODDY. That is a very high-level, aggregate goal for the Nation. I think that within the context of the particular agencies—and some are institutions, and some fund others—NSF, for example, does very little itself—that has to be descoped relative to what the mission is.

So a NIST, for example, worries about standards and metrology in order to understand which areas of science are relevant to, or we think are relevant, and there is guessing going on here and we all ought to acknowledge that, which are relevant there; and then have a retrospective process that measures the value of what has been done.

It can be done on a shorter term I think than most people generally acknowledge in the context of the value that they are charged with creating relative to providing a base relative to standards and metrology across a broad range of industries.

Mr. ROEMER. Okay. That helps me decide in terms of values a little bit better.

Did you want to follow up?

Dr. MONIZ. May I respond, as well?

It certainly is a rather high-level aggregate goal. Your question about how it would translate into, in some sense, program management is certainly a valid one. I have a few observations.

First perhaps is to say what it does not say. Specifically, it articulates the fact that ultimate societal outcomes of the support of fundamental science do not provide the matrix by which one evaluates the funding of today's fundamental science programs. That negative statement I think was a first important clarification in the process.

Secondly, what it does say in effect is that goal intrinsically has following it the statement that some version of merit review must be at the core of evaluating the program. So that is a very clear statement to the managers.

Then as one goes to developing some of the more quantitative matrix, I would say it would also lead—and these are just examples—it would lead to the suggestion that the issue of how a program is leading to a reasonable fraction of major advances in a field, how their investigators are represented at the conferences where they should be if they are doing leading-edge work, become more important indicators than, let's say, counting publications.

So as this filters into the agencies, hopefully panel two will clarify, that this will have clear operational consequences.

Mr. ROEMER. Let me change the game on you here, Dr. Zare, and not give you the same question. Let's say we have established then what goals we want to reach.

How do we then say to our program managers in terms of accountability whether they have over-performed or under-performed?

What kinds of things do we do to measure that over-performance and under-performance?

And how do we reward that? Or how do we use different measures to get them to perform better?

Professor ZARE. I am not sure I understand "over-performance" here in terms of if we are talking about leadership. It is hard to talk about over-performance in that area.

Mr. ROEMER. Well, no. I guess to "over-perform" would simply mean how do you reward them if in fact they have delivered on what you have set as a goal.

Professor ZARE. I do believe that you can assess different programs as to whether or not they are delivering. Let's take that overarching goal toward world leadership in science and engineering.

But you need a group of people who you regard as experts to also assemble the data that will support what they are saying to come together and make some judgment. And, based on that judgment, you can of course then produce your rewards.

You have got to choose these experts very, very carefully. If you choose the experts too narrowly, they only generally work in the area they know. Then you will get a conclusion that you will find hard.

Any of these, though, leave you still puzzled totally what to do. I do believe very much in this overarching principle as being useful. Maybe I am returning to the other question to explain to you. That ovearching principle allows you to stop the good and try the better. It gives you the justification for doing it.

That overarching principle also allows you to say. I must train the next generation—which is an important part, if we want to continue to have leadership.

Mr. ROEMER. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Mr. Roemer.

Mr. Gutknecht?

Mr. GUTKNECHT. Thank you, Mr. Chairman.

I would like to thank the distinguished panel for appearing today. My line of questioning is somewhat different. Perhaps I will throw this out and see if anybody wants to nibble on it.

One of the concerns I have—and we hear this occasionally—is that certain institutions, talking about over and under, certain institutions tend to get the lion's share of Federal grants. And there is occasionally, perhaps by unsuccessful parties saying, well, there is sort of an incestuous relationship between the Federal Government and certain agencies, almost like there are certain conflicts of interest.

I am wondering if any of you can comment on that as to whether you think that those charges are true? And, secondly, whether they are true or not, what can we do to guard against it?

Does anybody want to bite on that?

Dr. MCGRODDY. I am willing to take a nibble at that.

The natural forces at work will inevitably drive that to happen because, as we all know, the institutions always strive to survive, and to grow.

As I said earlier, the nature of the scientific disciplines in fact drives to the same thing, more of the same. We have been successful. Look, we had a meeting with 500 people last year and we only had 400 the year before; therefore, we are successful so we should grow and grow, and if we grow of course we can have 600 the next year.

So one of the things I believe is very important is to look at both institutions and programs which were put in place at an earlier time for a specific set of goals, to achieve a specific set of things, and in fact view them with somewhat more suspicion and in a somewhat more jaundiced way than one views things which are more recentin terms of their origin and therefore likely to be responsive to things that are relevant to the present.

It is sort of at an institutional level doing the same thing that we talked about doing at the programmatic level. Namely, looking at things that are good but there are better things to do with the fixed, or potentially reducing resource.

That is hard, and the system will always fight back on that.

Professor ZARE. May I add something to that?

Mr. GUTKNECHT. Sure.

Professor ZARE. You are really bringing up a painful issue of sunsetting certain things. If it involves individual workers, you hear a cry, but it is at a certain level. If it involves large facilities, there is a much louder cry.

We must, I think, take care every time we set up large facilities that we also set up the way that they can be declared successful and stopped. We do not always remember to do that. We are so enthusiastic at the time we set them up.

Dr. MCGRODDY. I think there is a consequent thing on that. If you look, for example, at the NSF Engineering Research Centers which were started roughly 10 years ago when Eric Bloch was the Director of NSF, those have a sunset in them. They can be funded for no more than 11 years.

It is not necessary that they stop, but—since it is doing science—at the end of the day they should have some impact on something else.

We just heard the sort of the expanded view of the goals. If they can't do that and develop support from the individual programs of DOE, DOD, NSF, industry, et cetera, it is probably better to let them wither, shrink, change, and put that kind of marketplace force in place to make that happen.

Professor ZARE. Indeed, that is what we did with the Science and Technology Centers at NSF.

Dr. MCGRODDY. Yes. I really meant the Science and Technology Centers.

Mr. GUTKNECHT. Dr. Moniz?

Dr. MONIZ. I would like to answer your question with a somewhat different point of view.

First of all, your question was focused on the issue of having a relatively small number, I think, of institutions which have very robust research enterprises and many others which have a lesser robust enterprise.

I think the peer review system, first of all, does by and large work well, and the fact is that it does tend to in some sense reinforce this position.

I would like to state, however, that in addition to having the broad goal which I outlined in terms of the overall fundamental science portfolio, it is clear that one has other subsidiary goals, including, for example, and I mentioned, let's say, the EPSCOR program as an example, which brings in an additional goal in terms of, in that case, 18 or 19 states which are rather low on funding, yet we have a rather overarching national goal for example in recognizing that this is a very important human resource base certainly at the high school and college level in those states and would like to provide the opportunity for those states to grow some first-class research enterprises.

The key is: the EPSCOR works because it adheres to the same principle. It is a peer-reviewed program, just with an additional subsidiary goal applied to part of the portfolio. That, I believe, is the approach that we should sustain.

That is why EPSCOR works. They have peer review with one more condition attached, and they have excellent research and excellent progress in those States.

Mr. GUTKNECHT. But in your view with peer review, do the peers tend to——

The CHAIRMAN. The time of the gentleman has expired.

Mr. GUTKNECHT. Thank you. I will come back to that later. Thank you.

The CHAIRMAN. Mr. Schiff?

Mr. SCHIFF. Thank you, Mr. Chairman.

First of all, gentlemen, I apologize for getting here a little bit late. A number of things happen at the same time around here, as I know this panel all knows.

I have this question, and you may have covered it, and if you did I apologize but I would like your view on one issue. That is, I am a member of what we now call "The Government Reform and Oversight Committee," which designed the Government Performance and Results Act. We were then the Government Operations Committee but with the same idea.

And of course it was created in an effort to try to create standards of measurement and accountability for agencies funded by Congress, not just scientific agencies, but including scientific agencies, so there would be some kind of measurement yardstick that Congress could use to see how something is going on.

Now that is the idea. That is the intent. But sometimes you pass a law and it really just sometimes creates a lot of pencil-whipping and a lot of produced paper and really no movement, more heat than light.

I would just like your views, if you care to express them. Is this a good Act? I mean, are we moving towards where we want to get to, or is it not?

Let me start on my left there.

Dr. MONIZ. Certainly I believe it is a very good Act. I think clearly it has to be applied with the flexibility inherent in the Act, as we discussed for fundamental science, but to me the issue of having a clear, sort of long-range-plan-based approach which then leads of course to assessment and performance reporting, I think really is very, very, helpful.

Those disciplines which I know which have been exercising that approach for many years now have been strengthened, have performed efficiently, and I believe the scientific community recognizes that and will support it.

The danger would be, frankly, if the implementation in areas like fundamental science were to sink into sort of a mechanical bureaucratic exercise with assessment matrix tricks which did not match the values that we were trying to propagate, in which case they would become negative features.

Mr. SCHIFF. Fair enough.

Mr. McGroddy?

Dr. MCGRODDY. I agree with Dr. Moniz.

I believe this is a very good Act. I think the two things that are important are one, to make sure that there is enough slack in the system that we do not inspect everything to allow people to go off and do great things that might take five or ten years to happen, and to understand that we are not measuring everything the way we would in an incubator.

Then the second point I think is to ensure that the balance of assessment has both a peer-reviewed, deep technical aspect to it, as well as a set of people who accept and understand the downstream things that are necessary to achieve value for society in this.

It is best if we have management in the institutions and the laboratories who have both of those things in the same head.

Mr. SCHIFF. Professor Zare?

Professor ZARE. I agree with what has been said, also, but I would like to suggest to you, respectfully, that this Act is not a cost-free Act. There are real resources that have to be devoted to implementing it.

Indeed, it is more than a good Act. In fact, it could be very much the way we should be shaping budgets that we present in the future. That is what is intended, and I think it can really serve us well. But I think to understand how to do it particularly in the science area, we are going to stumble around. Still, I believe in knowing how to implement it.

Mr. SCHIFF. Thank you very much, gentlemen.

Mr. Chairman, I yield back my time.

The CHAIRMAN. Thank you, Mr. Schiff.

Mr. Brown, questions for the panel?

Mr. BROWN. Mr. Chairman, first I apologize for coming in late. Second, I ask unanimous consent to put my very wise opening statement in the record at this point.

And thirdly, since I was not here to hear the testimony, I do not have any questions at this point.

[Laughter.]

[The opening statement of Mr. Brown follows:]

OPENING STATEMENT
HEARING ON
THE GOVERNMENT PERFORMANCE AND RESULTS ACT
BY
THE HONORABLE GEORGE E. BROWN, JR. (D-CA)
RANKING DEMOCRATIC MEMBER
COMMITTEE ON SCIENCE

July 10, 1996

I congratulate the Chairman for convening this hearing to review how the civilian science agencies are preparing to implement the Government Performance and Results Act.

The law has the laudable goal of instituting performance-based assessments of federal programs. The usual practice in managing federal programs is to consider only the inputs. That is, the tracking of the resources made available to carry out a program.

The Government Performance and Results Act, on the other hand, contemplates the establishment of well defined program goals and a set of metrics, which will then be used to assess whether the goals were achieved. If it can be successfully put in place, this approach will provide the basis for allocating scarce federal resources to those activities that produce demonstrable results.

The Congress, and the agencies themselves, will benefit from the establishment of a systematic and quantitative process for prioritizing federal R&D expenditures. The process will also focus greater attention on strengthening the connections between research investments and achieving national goals, such as an improved environment, economic prosperity, and national security.

Of course, success in implementing the Government Performance and Results Act is far from certain. The main issues that will determine the ultimate outcome are whether the requirements imposed by the law represent a fundamentally workable process and whether the agencies charged to carry it out are willing to devote adequate resources and are sufficiently determined to make it succeed.

Congress also has an important role in determining the outcome. Only by sufficient zeal in the oversight of the law's implementation will Congress send the message to the agencies that this is an important use of resources.

The hearing today will provide the Committee with an opportunity to review how the R&D agencies under our jurisdiction are preparing to implement the law. We are pleased to have an overview from the Office of Science and Technology Policy, as well as reports from the individual agencies.

We are interested in assessing the agencies' rates of progress and in exploring any barriers that the agencies have encountered that have impeded their progress. We certainly hope to explore the agencies' efforts to identify appropriate performance measures for outcomes of R&D. Also, it will be helpful to receive a perspective from industry where some experience has been gained in the application of performance assessment to R&D programs.

I am pleased to join the Chairman in welcoming our witnesses this afternoon, and I look forward to your testimony.

The CHAIRMAN. Thank you, Mr. Brown.

I think that will do it for panel number one. We thank you very, very much.

The only thing I would ask of each of you. Did any of you hear one of the other witnesses say something with which you vehemently disagreed that you would like to get your response on the record to?

[Witnesses nod in the negative.]

The CHAIRMAN. I am getting shakes—okay, very good. Thank you very much.

We will bring on the second panel.

[Pause.]

First of all, let me say that I am delighted to see this nice panel of witnesses. We are having some difficulty with some of the agencies getting people up here to talk to us about the budget, and so this is a topic where we have obviously drawn a good crowd and I really appreciate all of your coming here to testify today.

Dr. Petersen, I think we will start with you and we will just kind of move down the line then. I think what we have done is ask you to summarize in a three-minute period since we have so many of you at the table and that will allow us to get to our questions in a little more rapid fashion.

Dr. Petersen, thank you for being here.

STATEMENT OF DR. ANNE PETERSEN, DEPUTY DIRECTOR, NATIONAL SCIENCE FOUNDATION

Dr. PETERSEN. Good afternoon, Chairman Walker, Congressman Brown, and Members of the Committee.

I am Anne Petersen, Deputy Director of the National Science Foundation. I am very pleased to have the opportunity to speak briefly about NSF's efforts to implement the Government Performance and Results Act.

The intent of this Act is extremely important. NSF has long been committed to accountability to the American people for the investments we make in research and education.

The public must be fully informed about the results of investments of their Federal taxes. We believe that NSF's investments yield tremendous benefits for the Nation, and we welcome the opportunity to document this.

NSF has a long-standing tradition of assessing quality, and using the competitive process of merit review to make wise investments.

GPRA is consistent with this tradition.

At the same time, GPRA challenges us to extend our traditions to more systematically assess outcomes and management of our investments.

We have made significant headway in integrating GPRA principles and practices into our budget process. For example, we have developed a strategic plan with goals that guide us. We have identified key program functions that yield distinctive performance concepts, and we have experimented through pilot projects with performance planning and reporting.

We find that our greatest challenge with GPRA is setting annual quantitative performance targets for some of our programming.

Happily, there are areas where this is feasible. For example, proposal review and processing time, other customer service standards, and electronic financial management are all part of our ongoing annual evaluations of administration and management.

Similarly, number and nature of cycles used on supercomputers; efficiency of facility operations; and number and nature of users are quantifiable annual measures of research facilities. And our educational programs are routinely evaluated for outcomes such as improvement in student achievement, and increased effectiveness of educational systems; although even here annual performance targets would need to reflect the cumulative effects of past investments rather than only those of the current year.

Although there are some aspects of research project support that are amenable to quantifiable assessment, most of our goals in this area require a different approach.

Fundamental research, as you have heard from the previous panel, has long-term outcomes, including some that cannot be anticipated at the outset.

For example, a recent National Academy of Sciences Report concluded that in the field of high-performance computing, surely one of the fastest moving fields, it takes about ten years from fundamental computer science discovery to marketable application.

Further, a particular line of work is likely to have many research contributors and probably many funders before practical effects are seen on the economy or national well-being.

Thus, to assess progress toward our goal of world leadership in science and engineering, it is more appropriate to examine lines of work or entire fields over time, rather than the outputs of single projects in the year when the investment is first made.

Therefore, we believe that it will be more effective to assess outcomes of these investments through regular, periodic reviews of fields, with participation from all knowledgeable stakeholders, using the alternative format provided by GPRA.

We hope to identify ways to conduct these assessments without adding significantly to our costs, both in terms of dollars and in time required of our staff and our applicant and reviewer communities.

This has meant re-engineering several current processes at NSF. We are testing these changes this year and the next. We will know then whether we are able to minimize these additional costs, and, if not, how much GPRA will cost us.

The process of designing and pilot testing our GPRA implementation, of course, has involved additional staff and consultant time.

Through the GPRA process we believe that we will learn more about the nature of NSF's particular role with research and education across the spectrum of science and engineering. For example, a study of Nobel Laureates revealed that we have supported almost all of them at some point in their careers, including even biomedical scientists at an early point in their careers.

We believe that the GPRA assessment process may yield information with a potential to improve our effectiveness. Therefore, with sufficient flexibility, we expect the Government Performance and Results Act to benefit NSF.

Thank you again for this opportunity to testify. I would be happy to answer questions.

[The prepared statement of Dr. Petersen follows:]

Testimony of
Dr. Anne Petersen
Deputy Director, National Science Foundation
Before the
U.S. House of Representatives Committee on Science
Hearing on Civilian Science Agencies' Implementation of the Government Performance and Results Act
July 10, 1996

Mr. Chairman, Congressman Brown, and members of the Committee, I appreciate the opportunity to appear today to discuss efforts underway at the National Science Foundation to implement the Government Performance and Results Act. NSF fully supports the GPRA aim of improving agency accountability and we welcome the opportunity to more fully inform the public about the outcomes from investments in research. Fully implementing the law presents some new challenges to the Foundation, but we have been exploring the possibilities of the Act for three years, and we are confident that we will be ready for full implementation in Fiscal Year 1999.

In the fall of 1993, NSF volunteered to participate in a number of GPRA pilot projects, which are still active. We have also participated in inter-agency discussions of the implications of GPRA for research agencies, and in the preparation of the NSTC white paper on this topic. The more time we have spent in these discussions, the more aware we have become of NSF's distinctive role in the federal research enterprise, and of its unique position as a research agency in the GPRA process. Our fellow agencies have specific missions which define long-term outcomes for their research activities, while NSF has the mission of providing the intellectual capital that enriches, and may sometimes transform, all those missions. These factors have contributed to the level of attention and care we have given to formulating our response to this Act.

Earlier, we provided the Committee with documentation on our preparations for GPRA implementation, and we have therefore not included that detailed information in this testimony. We are preparing case studies of our experience with GPRA strategic planning and performance measurement for the Office of Management and Budget, and will forward a copy when they are in final form.

A results-oriented agency

Neither "performance" nor "results" is a new topic of interest at NSF. By the very nature of its work, NSF is steeped in performance information. Our research and education investments are made through a rigorous process of merit review with peer evaluation. One important element in those decisions is the performance competence of the applicant -- in the case of research, the investigator's record of past research accomplishments, including communication of findings and sharing of data and other research products. Other criteria focus on expected results: new discoveries or fundamental advances; new or improved technology or assisting in the solution of societal problems; and contributing to the Nation's research, education, and manpower base. When NSF grantees return to us for further support, they include information about results of prior work in their applications, and we require reviewers to take this information into account in decisions about further funding. With larger, more complex activities that stretch out over longer periods of time, our level of attention to performance and results is correspondingly higher. Centers, for example, generally go through an intensive review in their third and sixth years, in addition to regular site visits and evaluation of annual reports. Facilities receive similar regular reviews and recompetition. Finally, our portfolio of education activities receives intensive monitoring for results in addition to regular program evaluation.

Just as "performance" and "results" are familiar territory for NSF, strategic planning is by no means a new concept for us. Our mission was set in our organic act, and every year, we translate that mission into a set of projected investments in the form of our budget request. In formulating the plans represented in the budget, we consult broadly, both with the research and education communities and with other partner institutions, such as state and local governments, industrial firms, nonprofit organizations, academic institutions, professional societies, international organizations, and other federal agencies. This consultation happens in a number of ways: for example, in the process of merit review, which involves more than sixty thousand reviewers annually; in our eight major advisory committees and the other panels that report through them; and through the National Science Board, our governing body. This rich network of consultation is the steering mechanism that keeps the Foundation's activities, from broad allocations of funds through the design and implementation of new programs to the selection of specific projects, moving in directions that are widely seen as fruitful for the nation.

GPRA, however, does ask us to summarize and present the results of these information-gathering and consultative processes differently than we have in the past. Much of the performance information we now collect deals with immediate results at the project level. For GPRA we will be using that information to look at our set of investments as a whole.

Performance planning

GPRA's most profound challenges for NSF lie in the area of planning. Under the Act, NSF is required to submit a strategic plan that covers a five year period and will be updated every three years. GPRA further requires an annual performance plan, derived from the strategic plan, which sets quantitative targets for performance in a particular fiscal year. In research, it is vitally important that we be able to follow through on unanticipated breakthroughs. Such changes in direction are not consistent with goals tied to specific research directions. We have therefore used the required strategic plan as an opportunity to state our general objectives and strategies. The plan articulates three goals:

- Enable the U.S. to uphold a position of world leadership in all aspects of science, mathematics, and engineering.
- Promote the discovery, integration, dissemination, and employment of new knowledge in service to society.
- Achieve excellence in U.S. science, mathematics, engineering, and technology education at all levels.

It also identifies four core strategies: develop intellectual capital, strengthen the physical infrastructure, integrate research and education, and promote partnerships. While we have phrased these goals and strategies to be enduring and long-term, we also expect to be able to adjust them as needed based on changing conditions. Our current strategic plan was published in 1995, and our budget submissions to Congress for FY 1996 and FY 1997 both reported and were shaped by its contents.

Performance plans, however, present NSF with a particular challenge. For GPRA reporting, we have designated four key program functions – research projects, facilities, education and training, and administration and management – and have begun to present our budget along these lines. These categories were chosen in large part because they shared common performance expectations, even though the activities they encompass are spread across our organizational units. Using those common performance expectations, we have experimented with performance planning for all four key program functions. Our GPRA pilot projects, along with our ongoing efforts in educational program evaluation, have taught us important lessons in this area. We have learned, for example, that some of those areas are easier to address than others. We have some quantitative indicators of performance in education, facilities, and administration and management, but our learning process has also demonstrated the difficulty in setting quantitative performance goals for research. In particular, they have demonstrated the difficulty in expressing performance goals in a quantified form.

First is the time factor. Under GPRA, a performance goal is intended to refer to the results of the agency's budget allocation for a particular year. But the outcomes of NSF-supported activities typically build over long time periods, and specific uses appear at unpredictable intervals. The results that appear in a given fiscal year -- both discoveries and other benefits for society -- are therefore often the interactive products of funding over several preceding years. For example, NSF-supported research on geohazards increases the capability of predicting major catastrophic events by building understanding of their interface with ongoing phenomena and processes. NSF supports this area through investigator-initiated research, centers (both focused and broad-ranging), integrated international programs, and rapid-response scientific teams. One example of the payoff from this investment appeared when Mount Pinatubo erupted in 1991. Kelvin Rodolf, an NSF-supported investigator, was able to build on the base of knowledge about geohazards to accurately map the flows of dangerous hot mud slides, saving many lives and allowing the timely evacuation of Clark Air and Subic Naval Bases. If GPRA had been in effect, Rodolf's accomplishment could have been reported for 1991, but it clearly reflected much more than an FY 1991 investment. Like many of NSF's activities, the investment in geohazards research does not fit neatly into fiscal year boxes for the purposes of setting performance goals.

Second, GPRA calls for quantitative performance targets. But setting numeric targets on performance indicators for research and education activities shows clear potential to do more harm than good. In research, for example, there is a set of well-established quantitative performance indicators, but they reflect only short-term outputs, and not the longer-term outcomes that GPRA, and indeed NSF's mission itself, expects us and our grantees to focus on. If we focused the attention of NSF staff and grantees on output indicators—say, for example, publications in peer-reviewed journals—we would be deflecting their attention from the more fundamental goals we want them to strive for: extending the frontiers of knowledge, recruiting and educating the country's best minds for research, and carrying the excitement of discovery into the classroom. Rather than achieving the purposes of GPRA, this approach would instead defeat them.

For these reasons, we have proposed to use the alternative format for performance goals available under GPRA, where appropriate. This alternative allows us to state descriptive goals, while challenging us to determine whether we have met them in an independently verifiable way. For many of our own activities, rather than those of our grantees, more conventional performance goals will be possible. When we are putting a new program in place, for example, we will be able to articulate implementation goals. We are also experimenting with indicators for the merit review process, for example, indicators related to support for young investigators and diversity in the reviewer pool. In these areas, too, however, we are seeking not just *any* measure, but the *right* measures, the ones that keep us focused on making effective investments in research and education on behalf of the nation. Here, too, the indicators need to be balanced between quantity and quality.

Performance reporting

The use of the alternative format for performance goals has allowed us to make headway on designing a system for performance assessment that will be both efficient and effective. We are addressing the problem of the long-term, unpredictable payoffs from research and education investments by translating our performance goals into standards that can be applied to our portfolio retrospectively on a multiple-year basis. Using these standards, we can learn in a systematic way from past experience in order to plan better for the future, but on a longer time scale than GPRA's annual cycle. When we examine our investments in a given field, we can ask near-term questions about the management of the merit review process and grants program, along with longer-term questions about major advances in the field over the past decade and how NSF's grantees have contributed to and capitalized on them. Answering questions like this will require compilation of information from the program level up, and the process will therefore involve all NSF's professional staff and advisory committees, up to the level of the National Science Board. Examination of how funding strategies in the past have paid off will therefore provide inputs to a wide range of decisions about the deployment of resources in the future.

Second, descriptive performance goals will allow us to use quantitative performance information in its appropriate context. For example, for our facilities portfolio, we have developed measures of operational performance, but efficiency alone is not the goal of these investments. When we use descriptive goals to focus on the research payoffs from facilities, we can weigh the efficiency indicators appropriately into an overall assessment of performance and results. Similarly, our core strategy of developing intellectual capital leads to different output indicators in the different fields of research we support; these differences must be taken into account in interpreting indicators. In computer science and engineering, for example, software is a more important immediate product of the research process than publications; in the social sciences, books are more important than journal articles. The expected longer-term outcomes of our programs also vary. In computer science and engineering, new industries may develop out of given lines of research in a period of ten to fifteen years, while in environmental research, the building of international partnerships may be a more appropriate and productive expectation. By building reports of performance up from lower levels of our organization using goals-based performance standards, we can summarize NSF's overall performance within the framework of our strategic plan without forcing units into procrustean targets on a limited set of indicators. We intend to use major accomplishments alongside appropriate quantitative indicators as the basis for judgments about whether or not we are meeting our goals, and we expect to include such accomplishments in our performance reports.

GPRA requires independent verification of performance, whether descriptive or quantitative goals are used. To accomplish this in relation to our descriptive goals, we are planning to make use of our existing advisory structure, while recognizing that we will need some additional inputs to integrate across the more focused assessments. We are also improving the base of information that assessment panels will have available by redesigning our project reporting system. In both these areas, we have taken as a goal not to increase burden on the research community. We believe we will be able to achieve that goal, first, by tapping into the power of information technology, and second, by paring back on current functions in order to make room for the increased attention to performance and results.

Summary

In short, GPRA-type strategic planning has already had a positive impact within NSF. We are developing a system for performance reporting that draws on current practice while strengthening the base of information about performance and linking it more directly to the goals of our strategic plan. As you can see, the implementation of

GPRA into the research and education enterprise is a difficult and challenging prospect. NSF, along with our external community, is moving forward to implement the act in ways that are responsive to the act's goals and objectives while at the same time reflect the realities of the basic research and education process.

Thank you for this opportunity to testify on GPRA. I would be happy to answer any questions.

Mr. SCHIFF (presiding). Thank you very much.

I did fail to note that we will include all of your written testimony in the record, as well, and appreciate the fact that you are attempting to summarize.

Mr. Chupka?

STATEMENT OF MR. MARC CHUPKA, ACTING ASSISTANT SECRETARY FOR POLICY AND INTERNATIONAL AFFAIRS, UNITED STATES DEPARTMENT OF ENERGY

Mr. CHUPKA. Thank you, Mr. Chairman.

Mr. Chairman, and Members of the Committee, I am pleased to appear before you today to discuss the Department of Energy's progress toward implementation of the Government Performance and Results Act of 1993.

Under the leadership of Secretary O'Leary, the Department has proactively incorporated performance-based management methods and techniques throughout our business practices and operations.

For all practical purposes, the Department has been living the GPRA philosophy for over three years. We believe it makes good business sense.

Some of our key initiatives have included issuing the first-ever Department of Energy strategic plan in April of 1994; signing performance agreements between the Secretary and the President for Fiscal Years 1995 and 1996; and implementing a strategic management system that integrates our strategic planning, budget formulation and execution, and program evaluation processes across the Department.

I would like to provide copies of the aforementioned planning documents for the record.

These initiatives have already produced important benefits over the last three years. Our strategic planning efforts reshaped our mission and vision and focused our business priorities.

The identification of goals, strategies, and measures facilitated our budget formulation and decision-making processes.

Introducing performance measurements into our management and operating contracts have realized real savings.

The Strategic Plan helped guide our Strategic Alignment Initiative to reorganize the Department and re-engineer our management processes to focus on results, service quality, and customer satisfaction.

Finally, adopting a systems approach throughout the Department's organizational levels has improved program effectiveness and contributed to a government that works better and costs less.

Of special note, a team of employees from the Office of Policy and International Affairs has just received approval for a National Performance Review Hammer Award for their long-term and persistent effort in developing annual performance agreements that make the Department visibly and clearly accountable to the President and the taxpayers.

The Department is officially responding to GPRA at the agency-wide level. That is, there is a Department of Energy Strategic Plan, an Annual Performance Plan, and an Annual Performance Report.

Although written at the departmental level, these documents include key strategic goals, annual performance objectives, measures, and performance results for each of the Department's five business lines: science and technology, energy resources, national security, environmental quality, and economic productivity.

This basically means that GPRA planning, measuring, and reporting occurs at program levels in the Department and are then rolled up into Department-wide documents.

Let me briefly tell you the status of these documents.

In April 1994 the Department issued its first Strategic Plan entitled "Fueling a Competitive Economy." We will update our Strategic Plan in time to meet the September 30, 1997, GPRA requirement. We recognize that our next plan will need to more formally ensure stakeholder and customer consultations, and would like to work closely with this Committee to gain your input into our science and research development programs.

The Department is also preparing an annual performance plan as part of its Fiscal Year 1998 budget cycle. As part of the National Performance Review, the Department has performance agreements signed by the Secretary and the President for Fiscal Year 1995 and 1996.

We are the only Federal agency to have accomplished this.

These agreements identify specific commitments and measures of performance for our program areas and will provide valuable experience in the development of our performance plans beginning in Fiscal Year 1998.

A third component of GPRA is the Annual Performance Report. The Department has decided to adopt the GPRA principles of annual performance reporting by re-engineering its statutorily mandated annual report.

By this September we will publish a combined Fiscal Year 1994 and Fiscal Year 1995 Annual Report that will be performance-based and prototypical of the GPRA model.

At this point I would like to focus briefly on the GPRA-related activities of our Office of Energy Research. The Department of Energy's Science and Technology Team first met in October 1993 to formulate the Science and Technology Business Line portion of the Department's Strategic Plan.

This team included members from DOE headquarters and field offices, universities, national laboratories, and industry.

Consistent with the Department's Strategic Plan, the Office of Energy Research prepared a Strategic Plan that was issued in August 1995, a copy of which I would like to provide for the record.

The ER Strategic Plan identified goals of emphasizing scientific excellence and working in partnership with other organizations dedicated to advancing energy and supporting science.

The Energy Research Strategic Plan contains success indicators for each goal. They can be grouped into four broad classes:

One, quality of basic science;

Two, relevance to DOE missions and national needs;

Three, effectiveness and efficiency of construction and operation of research facilities; and

Four, good research program management.

These indicators are developed through peer review of qualified experts from industry, academic, government agencies and associated laboratories, performance-based research grants and cooperative agreements, and interagency participation in the National Science and Technology Council and Interagency Research Roundtable.

By utilizing Energy Research's Strategic Plan, Implementation Plans, and Performance Plan to develop and support a streamlined budget process, we can avoid creating additional overhead as a result of compliance with GPRA.

Performance assessment activities currently performed to maintain the high quality of productive research programs will continue, and the new management-by-results philosophy established by GPRA will in the long run eliminate unnecessary costs.

In conclusion, the Department of Energy believes that the Strategic Planning budget formulations, program evaluation, quality and performance-based management initiatives we have undertaken over the past three years align completely with the goals of GPRA.

We have already seen improvements in program effectiveness and accountability through our focus on results, service quality, and customer satisfaction, and we look forward to partnering with the Congress, and this Committee in particular, on energy research issues, OMB, and our customers and stakeholders in fulfilling our mission and serving the energy and national security needs of the Nation.

Thank you.

[The prepared statement and attachments of Mr. Chupka follow:]

Statement of Marc Chupka

Acting Assistant Secretary for Policy and International Affairs

Department of Energy

Before the

Committee on Science

U.S. House of Representatives

July 10, 1996

Statement of Marc Chupka
Acting Assistant Secretary for Policy and International Affairs
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Introduction

Mr. Chairman and members of the Committee, I am pleased to appear before you today to discuss the Department of Energy's progress and plans toward implementation of the Government Performance and Results Act of 1993 (GPRA). Under the leadership of Secretary O'Leary, the Department has taken a very proactive role in the incorporation of performance based management methods and techniques throughout our business practices and operations. Some of our key initiatives have included the issuing of the first-ever Department of Energy Strategic Plan in April 1994, the introduction of performance measures into our management and operating contracts, signed Performance Agreements between the Secretary and the President for FY 1995 and FY 1996, and the implementation of a Strategic Management System that integrates our strategic planning, budget formulation and execution, and program evaluation processes across the Department.

The initiatives I have just mentioned have already produced important benefits over the past three years. Our strategic planning efforts sharpened our mission and vision and focused our business priorities. The identification of goals, strategies, and measures facilitated our budget formulation and decision-making processes. The strategic plan was the blueprint for our Strategic Alignment Initiative that served as the basis for reorganizing the Department and reengineering our management processes to focus on results, service quality, and customer satisfaction. By developing a systems approach, we are bringing to the Department's organizational levels the consistency necessary for improving program effectiveness and a government that works better and costs less. Even in the absence of the GPRA requirements, the Department of Energy would continue to pursue these management process improvements because they make good business sense.

Of special note, a team of Policy and International Affairs employees have just received a National Performance Review "Hammer" Award for their long-term persistent effort in developing annual Performance Agreements that make the Department visibly and clearly accountable to the President and the taxpayers. Included in their effort was the development of an intuitive, practical, and graphical computerized tracking system that is available to any government agency. The systematic tracking and reporting of results against commitments and the sharing of this information within the Department and with the public are considered critical elements in establishing accountability with our own management and our customers and stakeholders. For the first time, in a formal and comprehensive way, the Department is identifying specific commitments and measures and reporting its performance. This important program evaluation tool also provides critical input for the next planning and budget formulation cycle, thus completing the systematic feedback loop.

The progress we have made to date and our plans for the immediate future will enable us to implement the GPRA requirements well ahead of schedule. As we move ahead, we recognize the importance of enhancing the level of involvement and participation with our customers and stakeholders and look forward to working with the Committee to ensure that the Department's science programs best serve the Nation's needs.

The Department's Approach to GPRA

The Department has responded to GPRA at the agency-wide level, i.e., there is a Department of Energy Strategic Plan, Annual Performance Plan, and Annual Performance Report. These documents, although written at the Department level, include key strategic goals, annual performance objectives, measures, and performance results for each of the Department's five business lines—Energy Resources, Science and Technology, National Security, Environmental Quality, and Economic Productivity. This basically means that GPRA planning, measuring, and reporting takes place at various levels in each of the Department's programs but are rolled up into Department-wide level documents. For the purpose of this testimony, I would like to briefly present the GPRA status at the Department level and then provide a more detailed description of how GPRA is being incorporated into our science programs.

Strategic Planning

In April 1994, the Department issued its first Strategic Plan, *Fueling a Competitive Economy*. It identified the five business lines mentioned above and identified four critical success factors (Human Resources; Trust and Communication; Environment, Safety, and Health; and Management Practices) that were considered essential to improving performance in our daily operations. Following the development of the Department's mission, vision, and core values by the Department's leaders, nine planning teams were established, one for each of the business lines and critical success factors. Each team identified a vision, strategic goals, strategies, and success measures for their respective areas. Customers and stakeholders, including OMB, Congressional committees, other Federal Agencies, state and local governments, interest groups, safety boards, and others participated at various levels in these team planning efforts. The strategic plan provided valuable input to the formulation of the Department's FY 1996 and FY 1997 Budgets and was critical to the development of the Strategic Alignment Initiative that will result in $10.5 Billion in cost reductions over 5 years, and which has been included in the Vice President's National Performance Review and government reinvention efforts.

The Department will update its strategic plan beginning in January 1997 and will have it available in time to meet the September 30, 1997 GPRA requirement. Starting this July, we are going to evaluate the current plan to determine how well we have performed against it and to ensure that "lessons learned" are incorporated into the next version. We also recognize that our next plan will need to address some additional requirements as specified in GPRA. One of these is to more formally ensure stakeholder and customer consultations in developing missions, strategic goals, and performance measures for each of our business lines. We would like to work closely with the Committee to develop the process for gaining your input to our science and research and development programs.

Annual Performance Plan

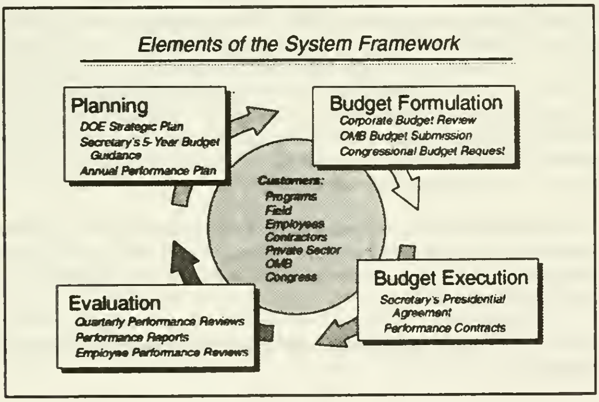
GPRA requires that each Federal agency prepare an Annual Performance Plan beginning with FY 1999. The Plan is to establish performance goals and performance indicators that are linked to the agency's strategic plan, and to identify the associated resources. The Department of Energy is preparing an Annual Performance Plan as part of its FY 1998 budget cycle. As part of the National Performance Review, the Department has Performance Agreements signed by the Secretary and the President for FY 1995 and FY 1996. We are the only Federal agency to have accomplished this. These performance agreements are similar in nature to the GPRA Annual Performance Plans, but they are based on actual appropriated funds and are signed following the Congressional budget process. These agreements identify specific commitments and measures of performance for our program areas and will provide valuable experience in the development of our performance plans beginning in FY 1998.

Annual Performance Report

The third major component of GPRA is the Annual Performance Report which is first required for FY 1999 and is due no later than March 31, 2000. The Department has decided to adopt the GPRA principles of annual performance reporting by reengineering its annual report. By this September, we will publish a combined FY 1994 and FY 1995 annual report that will be performance based and prototypical of the GPRA model.

Department of Energy Strategic Management System

On March 4, 1996, the Secretary issued a memorandum to all department elements to implement the Department of Energy Strategic Management System. The system clarifies, details, and documents the interrelated strategic planning, budgeting, and program evaluation processes throughout the Department. It incorporates the Department's internal commitment to performance-based management and the external requirements stemming from GPRA, the Government Management Reform Act of 1994, the National Performance Review, and Executive Orders on customer service and performance management. The system is designed to satisfy customer requirements through the key processes and products shown below.



Throughout the system, performance is the common link. Performance measurement expands the concept of "success" from the mere accomplishment of activities to that of delivering desired outcomes and results to customers. Performance measures provide the connection between the processes of planning, budgeting, executing, and evaluating. In planning, performance objectives are defined in terms of measurable results. In budget formulation and execution, resources are allocated and expended to deliver measurable products and services. In evaluation, success is based upon the measurement and analysis of actual performance. This concept of performance is cascaded through all of the Department's organizational levels, i.e., from the DOE Corporate level down to the contractor level. Ultimately, performance measurement provides a path of accountability between the Department's long-term vision and the day-to-day activities of individual federal and contractor employees.

The Role of GPRA in the Department's Science Program

As I stated earlier, GPRA activities will be reported at the Department level, but will be conducted at each of our program levels. At this point, I would like to focus on the GPRA related activities of our Office of Energy Research Program.

Stakeholder Involvement

A Department of Energy Science and Technology Team first met in October 1993, to formulate a strategic plan for DOE's Science and Technology Business Line. This team included members from DOE Headquarters and Field Offices, universities, National Laboratories, and industry. The team's objectives were to: identify a vision, strategic goals, strategies, and success indicators within the business line; prioritize the goals; and develop a plan to reach those desired outcomes. A second meeting of the team and several direct discussion sessions with DOE's customers and stakeholders resulted in the publication of the Science and Technology portion of the current DOE Strategic Plan—*Fueling a Competitive Economy*, April 1994. This process identified an important role for Science and Technology in supporting other DOE Business Lines.

Energy Research Goals

Consistent with the Department's Strategic Plan, the Office of Energy Research (ER) prepared a strategic plan. ER programs constitute over 95% of the activity in the Science and Technology business line. The ER plan identified ten strategic goals that sustain DOE's long-standing traditions of emphasizing scientific excellence and working in partnership with other internal and external organizations dedicated to advancing energy and supporting science. Energy Research articulated this in the *Energy Research Strategic Plan*, dated August 1995. These original ten goals have recently been condensed to five. Reaching the goals will help provide America with a range of science and technology options it needs for future prosperity. The goals are:

- Enable the United States to uphold and enhance its world leadership in science, mathematics, and engineering needed by all sectors of the Nation to enhance energy productivity and ensure reliable energy service while preserving human and environmental health and safety.

- Obtain major new insights into the nature of energy and matter to better understand our natural world.

- Provide the best and most advanced scientific research facilities and infrastructure to advance science, improve existing energy options, and create new energy choices.
- Ensure ER's programs are of the highest quality, are highly productive, strengthen and diversify the Nation's scientific work force, and that they are widely known, valued, and trusted.
- Ensure that ER activities are protective of our workers, the public, and the environment.

Performance Measures

The DOE and ER strategic plans for science and technology contain success indicators for each goal. They can be grouped in four broad classes: (1) Quality of the basic science as indicated by expert advisory committees, peer reviews, sustained progress, recognition by the scientific community, and world class research facilities; (2) relevance to DOE missions and national needs as indicated, for example, by supporting energy technology development, by utility of research results to customers, and by joining research efforts with others; (3) effectiveness and efficiency of construction and operation of research facilities as indicated, for example, by meeting user needs, achieving performance specifications, meeting schedule and cost milestones, and making possible research at the forefront of science; and (4) good research program management as indicated, for example, by the quality of research planning, meeting budget projections and milestones, and good decisions in managing and redirecting projects.

Performance Assessment

ER program managers regularly use peer review performance assessment to evaluate ongoing research. Peer review performance assessment includes competent, qualified, objective, and formal evaluation of programs using specified criteria and the advice of qualified experts. Expert peers come from industry, academia, and government agencies and associated laboratories. To be objective, peers must be reasonably independent and free from conflict of interest. The results of peer review assessment are recorded and, under appropriate controls, accountable to further review.

Peer review performance assessments meeting these criteria are applied to research and development (R&D) renewal proposals, projects, and programs. They are applied, as well, to the design and acquisition of major research facilities and to the formulation of multi-year research plans and strategies. Appropriate forms of peer review performance assessment are used by various organizational levels: the Secretary, Assistant Secretaries, Program Offices, National Laboratories, integrated R&D laboratories, research subcontractors (including universities), and laboratory user facilities. The nature of peer review assessment used at each level is tailored to the needs of that level.

The award of research grants and cooperative agreements is governed by the Department's Financial Assistance Rules, as promulgated in the Code of Federal Regulations (10 CFR Part 600). In April 1985, ER promulgated formal rules in the CFR governing the peer review assessment process for R&D financial assistance. These rules require the use of standard evaluation criteria and technical experts to perform credible assessments of all applications, solicited and unsolicited. These criteria are: scientific merit, appropriateness of method or approach, competency of applicant's personnel and proposed resources, reasonableness of proposed budget, and other factors established and set forth in the solicitation. Such assessments make use of standing committees, ad hoc committees, or field readers, and generally include at least three qualified persons from outside the awarding program office, in addition to the designated contracting officer's representative.

In addition to these assessments, the Department of Energy subjects a subset of both its in-house and its extramural projects to performance assessment by common sets of reviewers. This special effort, which has been underway for 14 years, appears to be unique in the Federal government.

Interagency Coordination

Interagency coordination is performed through an active participation in the National Science and Technology Council (NSTC) and other interagency fora. ER staff were active participants in the NSTC process to develop metrics for fundamental research, drafting and reviewing sections of the NSTC report. ER staff are also charter members of the Health and Human Services led interagency Research Roundtable. The roundtable is a collaborative effort by members of 14 Federal R&D-related agencies to develop a way to measure output/outcome characteristics of hard-to-measure activities, from analysis to basic research.

Integration of Financial and Performance Measurement

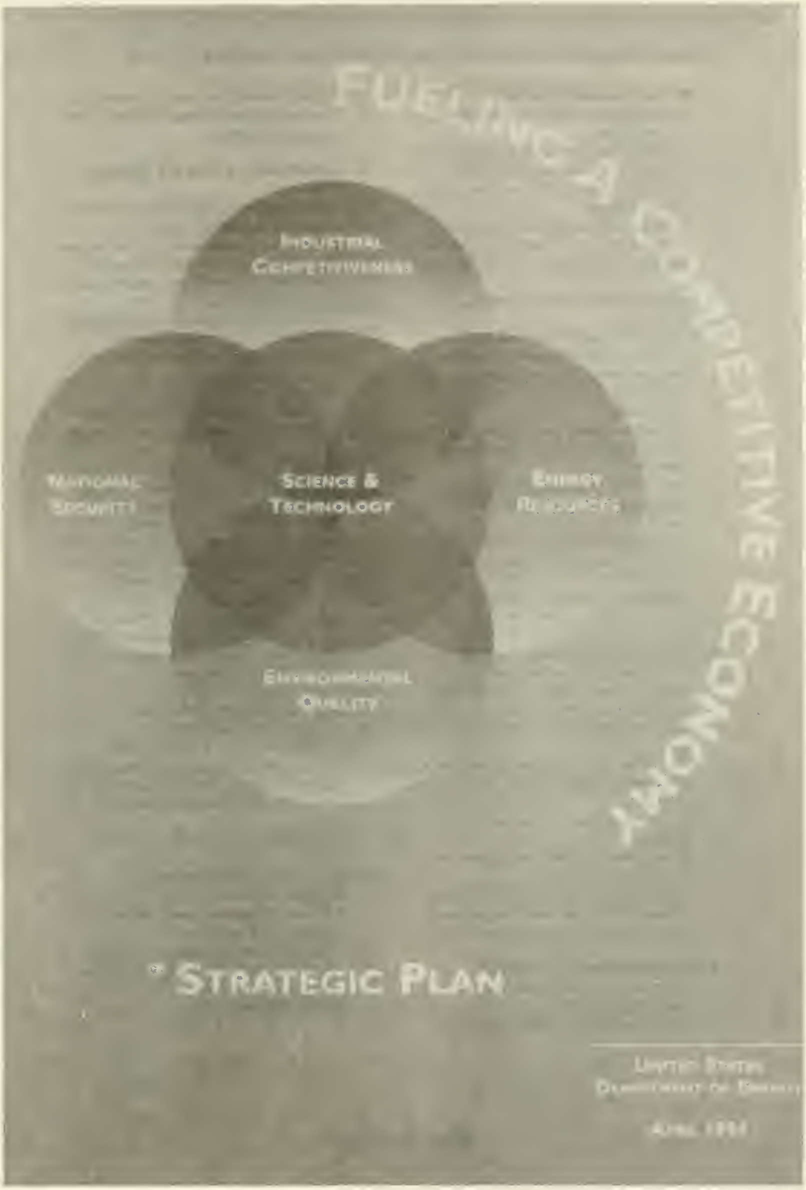
ER's Strategic Plan and operating plans provide the planning framework for ER's wide range of DOE mission-related technical disciplines. Several thousand researchers and educators will participate in the process of reviewing new proposals submitted to the program and participating in performance assessments of in-progress research requesting renewal funding. Five standing advisory committees—in basic energy sciences, biological and environmental research, high energy physics, nuclear physics, and fusion energy sciences—provide regular advice on program direction, content quality, and productivity.

Implementation Resource Requirements

We are working to avoid creating additional overhead as a result of GPRA. We utilize ER's Strategic Plan, Implementation Plans, and Performance Plan to develop and support a streamlined budget process. Planning, and discussions made in the planning stages reduce the time needed in budget formulation. The new "management by results" philosophy established by GPRA will, in the long run, reduce operating costs. Performance assessment activities currently performed to maintain the high quality and productive research programs will continue. Additional resources will not be needed to continue performance assessment of ER projects and programs.

Conclusion

In conclusion, the Department of Energy believes that the strategic planning, budget formulation, program evaluation, quality, and performance-based management initiatives it has undertaken over the past three years are in complete alignment with the goals of GPRA. We have already seen improvements in program effectiveness and accountability through our focus on results, service quality, and customer satisfaction. We look forward to partnering with the Congress, OMB, and our customers and stakeholders in fulfilling our mission and serving the energy and national security needs of our Nation.



Fueling a Competitive Economy

Strategic Plan

United States
Department of Energy

April 1994

OUR CORE VALUES

We have developed the following core values which will allow us to fulfill our vision.

1. **We Are Customer-Oriented**
   - Our decisions and actions are responsive to the customer's needs.
   - We foster a participatory way of doing business in which the opinions and input of diverse stakeholders are sought and considered prior to making decisions.
   - Policies to address major challenges are developed in a proactive, collaborative way with our customers and stakeholders.

2. **People Are Our Most Important Resource**
   - We value the needs of individuals.
   - We are committed to improving the knowledge, skills, and abilities of our employees by providing opportunities for professional development and achievement.
   - We are committed to providing a safe and healthy workplace for all our employees and contractors.
   - We value the richness, experience, and imaginative ideas contributed by a diverse workforce.
   - We share credit with all contributors.
   - We value listening as an essential tool in learning from others.
   - Employees are forthright in sharing their experiences so we can learn from each other.

3. **Creativity and Innovation Are Valued**
   - We are committed to a flexible operating environment that facilitates the pursuit of new technologies, processes, programmatic approaches, and ideas that challenge the status quo.
   - We seek out, nurture, and reward innovation in daily activities, ranging from the routine to the complex.
   - Employees are empowered to pursue creative solutions.
   - Resourcefulness, efficiency, and effectiveness are recognized and well regarded.
   - Adaptable, entrepreneurial approaches that can respond quickly to the rapidly changing world business and political environment are essential.

4. **We Are Committed to Excellence**
   - Quality and continuous improvement are essential to our success.
   - We are committed to excellence in everything we do.
   - Through scientific and technical excellence, we are committed to enhancing the Nation's ability to compete globally.

5. **DOE Works as a Team and Advocates Teamwork**
   - We reinforce the notion of a common or greater departmental good and encourage interdepartmental teamwork to achieve this goal.
   - We value teamwork, participation, and the pursuit of win/win solutions as essential elements of our operating style.
   - We work as a team with other Federal agencies, government organizations, and external stakeholders in pursuing broader national objectives.
   - We recognize the needs of others for information, and we communicate knowledge and information in an open and candid manner.

6. **We Respect the Environment**
   - We will be a leader in improving the quality of the environment for future generations.
   - We recognize the importance of the environmental impacts of our operations, and we develop and employ processes and technologies to reduce or eliminate waste production and pollution in these operations.
   - We place high priority on the protection of public health and safety and restoration of the environment through cleanup of environmental damage caused by past operations.

7. **Leadership, Empowerment, and Accountability Are Essential**
   - We are visionary in our everyday activities.
   - Leaders trust and support individuals to make informed decisions about the processes they own.
   - We are effective stewards of the taxpayer's interests.
   - Our actions are result-oriented.

8. **We Pursue the Highest Standards of Ethical Behavior**
   - We maintain a personal commitment to professionalism and integrity.
   - We assure conformance with applicable laws, regulations, and responsible business practices.
   - We keep our commitments.
   - We are objective and fair.

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TABLE OF CONTENTS

	Page
Message from the Secretary	ii
The Department of Energy's Strategic Outlook	1
The World Has Changed	1
The Strategic Response	2
Our Unique Capabilities	2
Our Mission	4
Vision	4
Core Values	5
The Total Quality Philosophy	5
DOE's Five Businesses	5
DOE's Critical Success Factors	7
Key Customer and Stakeholder Considerations	7
Situation Analysis	8
The Business Strategies	12
Industrial Competitiveness	12
Energy Resources	14
Science and Technology	17
National Security	20
Environmental Quality	24
The Critical Success Factor Strategies	27
Communication and Trust	27
Human Resources	29
Environment, Safety, and Health	31
Management Practices	34
Updating the Strategic Plan	37

MESSAGE FROM THE SECRETARY

The Department of Energy has a rich heritage of meeting important national goals in the areas of energy, national security, science, and technology. The end of the Cold War, and the election of President Clinton, have given us a new national agenda. Through a comprehensive strategic planning process, we have determined that the Department must now unleash its extraordinary scientific and technical talent and resources on new and more sharply focused goals: fueling a competitive economy, improving the environment through waste management and pollution prevention, and reducing the nuclear danger.

These goals cut across our program areas, core competencies, and disciplinary expertise. Tackling them requires a commitment to teamwork throughout the Department and our Administration, with the goal of a high level of integration across departmental business lines. We need the advice and thinking of our customers and stakeholders. We need new partnerships with communities, other Federal agencies, academia, State and local governments, and industry.

This strategic plan is an initial step in an ongoing effort to define and integrate the business activities of the Department of Energy. The plan helped shape the fiscal year 1995 budget and will play a central role in shaping future budgets.

In addition to redefining what our business lines are, we are changing how we do business. Critical to our success has been an innovative approach to communication and trust, human resources, environment, safety, and health, and management practices. We embrace continuous quality improvement as the only path to successful change.

The goals, strategies, and performance indicators presented in this plan will allow us to measure progress toward our new vision—a vision of providing bold leadership in addressing some of the Nation's most important needs. I look forward to working with you to make this strategic plan a reality.

Hazel R O'Leary

Hazel R. O'Leary
Secretary of Energy

THE DEPARTMENT OF ENERGY'S STRATEGIC OUTLOOK

THE WORLD HAS CHANGED

This Administration was elected with a new mandate and vision for America: our challenge is to move away from the Cold War economy, invest in people and technology to strengthen the economy and protect the environment, and reinvent a government that is efficient, serves the American people, and provides more services with fewer resources.

This strategic plan realigns and integrates the Department's unique scientific and technological assets to achieve this vision.

The Department's first priority is to help the President achieve his vision of an investment-driven economy capable of creating high-wage jobs that increase the incomes of the American people. That requires a strategy for empowering and utilizing the Department's tremendous scientific and technological assets—30,000 scientists and engineers, including 58 Nobel Prize winners, at laboratories with a capital value of $30 billion—to help U.S. industry compete in a global economy. The Department has a unique role in reconciling economic, energy, and environmental goals by helping industry develop environmentally conscious processes, technologies, and materials.

Only recently have the public and policy makers begun to understand inter-relationships between energy production and use, and its impact on the environment and economic growth. We are shifting our energy research and development focus to capitalize on the massive markets at home and abroad for sustainable energy technologies that create jobs by emphasizing energy efficiency and commercializing renewable resources, and to ensure that we use fossil fuels economically and cleanly.

The end of the Cold War has given us a new set of challenges to address in our national security mission: nonproliferation, the safe dismantlement of nuclear weapons, and maintenance of the stockpile without nuclear testing. The old danger was the threat of nuclear conflict. The new danger is proliferation of nuclear weapons and materials into the hands of rogue states and terrorist groups. The Department is addressing these challenges through the innovative and broad application of our assets.

Nuclear weapons production created an estimated $300 billion cleanup legacy that is, today, the single largest environmental program in history. We are now redirecting the same national commitment that built our nuclear arsenal toward addressing the resulting environmental and safety risks at thousands of contaminated sites. We can succeed in this mission only by meaningfully involving States, Native American Nations, and citizens in the decision-making process, by developing new technologies to clean up sites, and by reducing future costs through new strategies for minimizing waste and preventing pollution.

Just as changes in the world demand a strategic response to what we do, they require a strategic response to how we do it. The shift in our national security mission requires a strategy for replacing secrecy with openness. Similarly, we are moving from a reactive approach to environment, safety, and health concerns to a proactive approach.

Finally, one of the biggest changes is that this Administration is serious about reducing the Federal budget deficit, which means we must take on our new missions and deliver more results with less money. This requires a strategy for adopting the best management, human resources, and environmental, safety, and health practices of the private sector: total quality management, defect prevention, diversity, and customer responsiveness.

THE STRATEGIC RESPONSE

Recognizing these changes in the world, and our need to change with them, led to the massive reshaping of our missions, priorities, and business practices. Tinkering around the edges was not enough—we had to start anew.

Our response to this challenge began in the summer of 1993 with an empowerment summit at Motorola-Milliken Quality Institute to address these issues. Through a total quality management learning experience and through listening to citizens, business groups, our neighbors, and our industry partners, we agreed that dramatic change was required, not only in the Department's business lines but in how we managed our business. The Department's strategies for an ongoing planning process emerged from those meetings.

Continuous quality improvement is the only path to successful change.

The strategic planning process, led by Susan Tierney, the Assistant Secretary for Policy, Planning, and Program Evaluation, has been the most ambitious and wide-ranging planning exercise in the history of the Department of Energy. We began by breaking down the walls and barriers that isolated our business lines. For the first time, we challenged everything we do. The process included all of the Department's leadership, hundreds of career employees from headquarters and the field, our national laboratories, and external stakeholders. It was the highest priority activity for all involved.

The results of this process have been far-reaching. The words that follow explain a new Department of Energy, an organization with new priorities and a sense of purpose, a new vigilance, and a culture and values that will bear no resemblance to the previous organization that grew out of the Cold War.

The vision, priorities, and strategies that emerged from this process are detailed in this plan. They have already been used to realign the Department's fiscal year 1995 budget. As this plan evolves, the process will reach out even further to involve additional customers and stakeholders. It is the roadmap to guide the Department's conscience, policies, and decision-making in the years to come.

OUR UNIQUE CAPABILITIES

A critical step in our strategic planning process was to inventory our existing capabilities. What we found was that the Department of Energy has developed a mix of core competencies that make it uniquely suited to advance science and technology to fuel a competitive economy, secure clean, reliable energy resources, improve the global environment, and reduce the nuclear danger.

The Department of Energy's roots can be traced to the Manhattan Engineer District of the U.S. Army Corps of Engineers, which was established in 1942 to manage development of the atomic bomb. After World War II, Congress created the Atomic Energy Commission in 1946 to direct the design, development, and production of nuclear weapons.

The Atomic Energy Commission was also responsible for developing nuclear reactors, and, in later years, regulating the commercial nuclear power industry. Contributions from these early efforts included isotope power sources for space missions, nuclear medicine, and high speed computers.

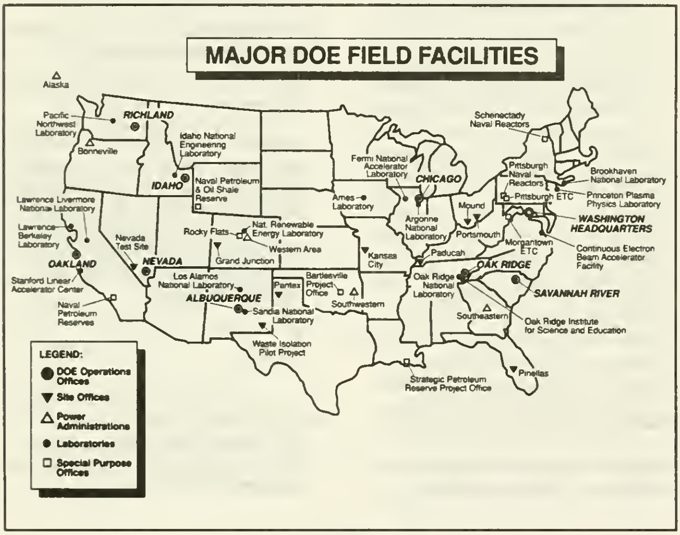
In 1975, Congress replaced the Atomic Energy Commission with two new agencies: the Nuclear Regulatory Commission and the Energy Research and Development Administration, created to manage the nuclear weapons, naval reactor, and energy development programs, and to research the environmental, biomedical, and safety aspects of energy technologies.

In 1977, Congress created the Department of Energy, which broughr together functions and responsibilities of the Energy Research and Development Administration and units of several other agencies under one cabinet-level department.

The Department's unique energy-, defense-, and research-related responsibilities have led to distinctive and singular scientific and engineering core competencies including:

- Energy and environmental technologies.
- Advanced materials development.
- Advanced manufacturing and process technology.
- High-performance computing and communications.
- High energy and nuclear physics.
- Bioscience and biotechnology.

The Department of Energy manages a major part of the Nation's Federally funded civilian science, technology development, and engineering resources, consisting of 9 major


MAJOR DOE FIELD FACILITIES
Alaska
Pacific Northwest Laboratory
RICHLAND
Bonneville
Idaho National Engineering Laboratory
IDAHO
Naval Petroleum & Oil Shale Reserve
Lawrence Livermore National Laboratory
Lawrence Berkeley Laboratory
Nevada Test Site
NEVADA
OAKLAND
Stanford Linear Accelerator Center
Naval Petroleum Reserves
Rocky Flats
Nat. Renewable Energy Laboratory
Western Area
Grand Junction
Los Alamos National Laboratory
ALBUQUERQUE
Sandia National Laboratory
Waste Isolation Pilot Project
Pantex
Bartlesville Project Office
Southwestern
Ames Laboratory
Kansas City
Fermi National Accelerator Laboratory
CHICAGO
Argonne National Laboratory
Mound
Portsmouth
Paducah
Oak Ridge National Laboratory
OAK RIDGE
Southeastern
Oak Ridge Institute for Science and Education
SAVANNAH RIVER
Strategic Petroleum Reserve Project Office
Pinellas
Schenectady Naval Reactors
Pittsburgh Naval Reactors
Pittsburgh ETC
Brookhaven National Laboratory
Princeton Plasma Physics Laboratory
WASHINGTON HEADQUARTERS
Morgantown ETC
Continuous Electron Beam Accelerator Facility
LEGEND:
● DOE Operations Offices
▼ Site Offices
△ Power Administrations
• Laboratories
□ Special Purpose Offices

multi-program laboratories, 10 single-purpose laboratories, 11 smaller special-mission laboratories, and a wide range of special user facilities critical to U.S. industry's global competitiveness.

In fiscal year 1994, the Federal Government's total funding for research and development was $72 billion, spread across 24 agencies. The Department of Energy's share of this research, $7 billion, is the fourth largest and represents almost 10 percent of the total Federal spending.

Recent breakthroughs emanating from the Department's system of laboratories include:

- The world's record in photovoltaic energy conversion efficiency at the National Renewable Energy Laboratory.
- The world's record for fusion power levels produced at the Princeton Plasma Physics Laboratory.
- The world's most powerful source of "soft" x-rays at the Lawrence Berkeley Laboratory.

The Department has extended its basic science with a new emphasis on applied research and partnering with industry. This is best exemplified by the Clean Car Initiative, a Cooperative Research and Development Agreement, negotiated with General Motors, Chrysler, and Ford to develop efficient, clean vehicles that are practical and affordable. Other examples of innovative partnerships include DOE defense technology that is now being used to reduce medical radiation doses and provide better images of mammograms, a broad-based partnership with the integrated textile industry (AMTEX), and a new process for soldering printed circuit boards that eliminates the use of ozone-depleting chemicals while saving energy.

We are the leading Federal agency in patent applications with more than 1,000 from 1990 to 1992, as well as the leading agency in licenses granted with more than 400 during that same period. As an example, the Los Alamos National Laboratory developed and patented an acoustic resonant ultrasound spectroscopy technology to detect defects in aircraft wheels and that is now being used to determine the structural integrity of bridges throughout the Nation.

In 1993, the Federal Government received 34 "R&D 100 Awards" given annually for the most important inventions—DOE won 26 of them. An example of an award from 1992 is the solar water detoxification system which has become part of a Cooperative Research and Development Agreement with industry. The system uses sunlight and a nontoxic catalyst to destroy hazardous organic substances in groundwater and industrial waste water.

OUR MISSION

We possess the human and physical assets to achieve the mission that follows:

> ***The Department of Energy, in partnership with our customers, is entrusted to contribute to the welfare of the Nation by providing the technical information and the scientific and educational foundation for the technology, policy, and institutional leadership necessary to achieve efficiency in energy use, diversity in energy sources, a more productive and competitive economy, improved environmental quality, and a secure national defense.***

VISION

By the turn of the century, the Department of Energy through its leadership in science and technology will continue to advance U.S. economic, energy, environmental, and national security by being:

- A key contributor in ensuring that the United States leads the world in developing, applying, and exporting sustainable, clean, and economically competitive energy technologies.
- A key contributor in mainraining U.S. global competitiveness through leadership in environmentally-conscious materials, technologies, and industrial processes.
- A major partner in world class science and technology through its national laboratories, research centers, university research, and its educational and information dissemination programs.
- A world leader in environmental restoration, waste management, and pollution prevention.
- A vital contributor to reducing the global nuclear danger through its national security and nonproliferation activities.
- A safe and rewarding workplace that promotes excellence, nurtures creativity, rewards achievement, and is results-oriented and fun.

CORE VALUES

The Department will succeed only through the efforts of its people. How well we perform individually and collectively is a function of the beliefs and values that motivate our behavior. The employees of the Department of Energy have chosen the following core values to serve as guideposts and our conscience in fulfilling our mission and achieving our vision.

1. We are customer-oriented.
2. People are our most important resource.
3. Creativity and innovation are valued.
4. We are committed to excellence.
5. DOE works as a team and advocates teamwork.
6. We respect the environment.
7. Leadership, empowerment, and accountability are essential.
8. We pursue the highest standards of ethical behavior.

THE TOTAL QUALITY PHILOSOPHY

Our core values will define our culture. Our culture will help us achieve our vision to fuel a competitive economy. A philosophy of total quality management and continuous improvement will serve as the foundation to meet the needs of our customers and allow us all to maximize our potential and make work rewarding.

Total quality will be achieved through customer satisfaction, leadership commitment, continuous improvement, labor/management partnering, and employee involvement. Our journey towards total quality has already begun, and there are many important efforts underway that support this new approach. Examples include customer service plans, process improvement teams, leadership training to support our core values, and implementation of toral quality guidelines.

Employees and management working together on these key initiatives will empower all of us ro improve customer satisfaction, focus our energy on value-added products and services, and make our jobs more rewarding.

DOE'S FIVE BUSINESSES

In response to world changes and today's new challenges and priorities, we took a fresh look at our business lines. What we found were mission areas that operated in a vacuum from one another. There was little synergy or integration of departmental assets. In general, little communication across organizational lines occurred. We found an organization structured to meet demands and challenges that were no longer relevant. We recognized that our science and technology capabilities had not been strategically leveraged. We decided to fundamentally reorient both the nature of our businesses and how they were managed.

Through our strategic planning efforts, we identified five businesses that most effectively utilize and integrate our unique scientific and technological assets, engineering expertise, and facilities for the benefit of the Nation. These new businesses which directly affect the security and the quality of life of every American, are:

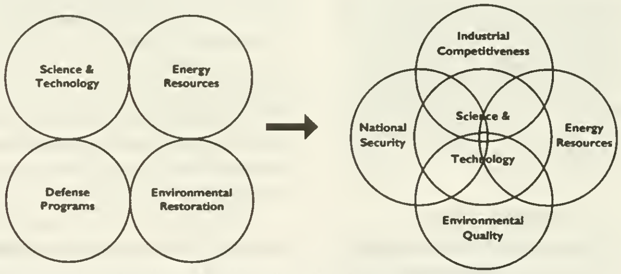
Industrial Competitiveness: Promote economic growth and the creation of high-wage jobs through research and development partnerships with industry, drive products into the domestic and international marketplace, and help industry become more competitive by cost-effectively shifting from waste management to resource efficiency and pollution prevention.

Energy Resources: Encourage efficiency and advance alternative and renewable energy technologies; increase energy choices for all consumers, assure adequate supplies of clean, conventional energy, and reduce U.S. vulnerability to external events.

Science and Technology: Use the unique resources of the Department's laboratories and the country's universities to maintain leadership in basic research, increasingly focus applied research in support of the Department's other business lines, and maintain world technical leadership through long-term, systemic reform of science and mathematics education.

National Security: Effectively support and maintain a safe, secure, and reliable enduring stockpile without nuclear testing, safely dismantle and dispose of excess weapons, and provide the technical leadership for national and global nonproliferation activities.

Environmental Quality: Understand and reduce the environmental, safety, and health risks and threats from DOE facilities and decisions, and develop the technologies and institutions required for solving domestic and global environmental problems.



The Department Has Fundamentally Reoriented Its Business Lines For The Benefit Of The Nation.

DOE's CRITICAL SUCCESS FACTORS

Working together, we recognized that for our business lines to produce results for the American people, our organizational systems needed realignment and integration. We have identified four critical success factors that must be integrated into our five business lines. These critical success factors are:

Communication and Trust - how we communicate information and build trust within the organization and with our stakeholders and customers.

Human Resources - how we recruit, train and develop, reward performance, motivate, and promote diversity within our workforce.

Environment, Safety, and Health - how we ensure the safety and health of workers and the public, and protect and restore the environment.

Management Practices - how we allocate, spend, and account for resources and procure, produce, and contract for goods and services—the tools we use to get it all done.

KEY CUSTOMER AND STAKEHOLDER CONSIDERATIONS

DOE's customers and stakeholders include the U.S. taxpayer; the energy consumer, the energy producer, the energy regulator, and the energy investor; citizens who live near DOE facilities; the businesses who work with DOE laboratories, or who are affected by their products; the family of DOE employees, laboratories, universities, contractors, and suppliers; Federal agencies, State and local governments and Native American Nations; the Congress; the President and his Administration; foreign governments; and the news media and interest groups.

Our most important customers are the next generations.

Our most important customers are the next generations, to whom we wish to leave a more prosperous and secure world.

Our customers and stakeholders have many concerns:

- The public demands more accountability in government actions and spending. They expect more results at lower cost.
- There is widespread national and international concern about the management and disposition of excess worldwide nuclear weapons and their components following the end of the Cold War.
- The resolution of civilian and defense radioactive waste disposal alternatives will require more meaningful and innovative stakeholder participation than in the past.
- Public opposition to the siting of new energy-related facilities is complicating the Nation's energy infrastructure.
- The public's questioning of its support for basic science creates a challenge for the Nation because our knowledge-based economy has historically benefited from science's contribution.
- The Department's current approach toward increasing industrial competitiveness does not reach a sufficient number of small businesses. A better technology deployment infrastructure is needed.
- The public and business communities are increasingly concerned about how we reconcile the goals of economic growth and job creation with environmental quality goals.

SITUATION ANALYSIS

What are the key factors in today's world affecting the future of the Nation and the Department's programs? A situation analysis for each of the five businesses and four critical success factors is summarized as follows:

Businesses

Industrial Competitiveness. Industrial competitiveness requires partnering with industry and other Federal agencies to put the vast scientific and technological assets of the Department and its laboratories and facilities to the best use in advancing the U.S. position in a global market that is increasingly competitive. Continued scientific and technological innovation is the key to sustaining long-term economic growth to the year 2010 and beyond.

High-wage jobs will be created by economic growth based on technological innovation. At the same time, a cleaner environment will result from continued DOE-led research in energy and material efficiency for industrial processes. Industrial resource efficiency prevents pollution and increases competitiveness by improving overall process efficiency, while simultaneously helping to promote the knowledge-based jobs that are the key to enduring economic success. This technology strategy is also the key to sustainable development.

Enhancing energy efficiency is good for the economy, the environment, and the Nation's security.

Over the next 30 years, there will be a huge international market for energy efficient, renewable energy, and environmental technologies. As developing nations invest in new industrial infrastructure to fuel growth, there will be a growing emphasis on clean manufacturing processes, as well as continued interest in cleanup and waste management. The Department's goal is to assist industry in developing these technologies so that U.S. firms can take advantage of these opportunities.

The Department of Energy is well positioned to provide substantial contributions to industrial competitiveness and environmental quality, although achieving the potential will be a continuing challenge. This challenge will include continuous process improvement in developing strategic partnerships with industry, close coordination and teaming with other Federal agencies, a more focused use of our national laboratories, and disciplined attention to quality management principles.

Energy Resources. A strategic energy policy is essential to promoting economic growth, high-wage jobs, and energy security while preserving the environment. Improving the efficiency with which the Nation uses energy is essential to reconciling these goals. The Energy Policy Act of 1992 will provide guidance in achieving our energy objectives, although fulfilling its requirements will be difficult in this era of fiscal constraint. Enhancing energy efficiency is good for the economy, the environment, and the Nation's security, and is clearly the number one energy priority of this Administration.

Fossil fuels will remain critical components of energy supply in every nation for the foreseeable future. Domestically, coal, natural gas, and oil will continue to provide the majority of energy for electricity generation and the buildings, industrial, and transportation sectors. We must focus on using these fossil fuels more efficiently and cleanly.

The Nation's dependence on oil imports is increasing significantly. This dependency may be reduced by increasing the efficiency of energy use in buildings, appliances, production processes and equipment, and in the transportation sector; greater use of renewables and alternative fuels; and boosting American production through the Domestic Natural Gas and Oil Initiative including enhanced investments in technology research and market expansion. At the same time, we must keep open all supply options to maintain the flexibility to respond to dynamic market conditions.

One way the Federal Government can set an example for the Nation is through the improved enetgy management of its buildings and facilities and the wider use of energy-efficient, alternative fuel vehicles. Additionally, the President's Climate Action Plan will provide a catalyst for mobilizing the public/private cooperation necessary to increase the use of energy efficiency and renewable energy.

Science and Technology. Investments in research and development have a strong influence on long-term productivity and high-wage job growth. As the United States prepares to compete in a dynamic global economy, it must lead in knowledge-based skills. This requires that both government and industry significantly invest in basic and applied science and the facilities, infrastructure, and trained work force to support technological leadership. Federal spending is constrained, however, so the Department must carefully balance its investments in long-term fundamental research against research and development with a near-term payoff.

Science and technology provide the knowledge that drives our future.

Careful management of the scientific portfolio is particularly important as American companies are increasingly using corporate funds for short-term development and improvements of their products and services while cutting back on long-term research. The challenge to the Department's science and technology programs is to help industry compete effectively in the near-term and also to meet their need for long-term research while providing the accountability and environmental responsibility expected by the public. This has become increasingly important as industry continues to shift away from basic research.

National Security. The end of the Cold War and the collapse of the Soviet Union require a profound change in the nature of the Department's nuclear weapons complex and a strengthening of our nuclear nonproliferation activities. The nuclear weapons complex was created to yield large numbers of increasingly sophisticated weapons. The complex must be transformed into a system whose purpose is to reduce the nuclear danger. This transformation will enable some of the science and technology of the DOE weapons laboratories and facilities to be redirected to help meet new needs, both domestically and abroad, such as flexible, clean, energy-efficient manufacturing.

The Department foresees a future national security environment in which there will be significant numbers of nuclear weapons in a still risky and chaotic world. In this environment, the United States will continue to rely on nuclear deterrence and a nuclear-powered navy. We are committed to a science-based program to maintain the nuclear stockpile without testing, safely dismantle nuclear weapons, achieve a comprehensive test ban treaty, extend the Nuclear Nonproliferation Treaty, and counter the proliferation of weapons of mass destruction.

Recognizing that openness is essential to accountability and trust, we will take an aggressive approach to declassify information about the Department's activities while maintaining the Nation's security.

Environmental Quality. The Administration is committed to honoring the Government's obligation to address the legacy of the U.S. nuclear weapons complex and high-level nuclear waste from nuclear power plants in order to protect human health and safety and the environment. We are determined to achieve those objectives efficiently and cost-effectively, which will require continued management reforms. At the same time, we will use pollution prevention to reduce the Department's ongoing waste streams.

DOE has responsibility for 137 sites nationwide. Portions of the over 3,300 square miles of lands managed by DOE contain contaminated soil, groundwater, and structures. As the weapons complex is downsized, facilities no longer needed will be decommissioned and decontaminated—a formidable task compounded by a lack of adequate environmental technology and a complex regulatory regime.

We must include the public in frank discussions of risk, resources, and priorities. Still, the increasing clash between the legal requirements relating to the Department's environmental activities, the current technical limitations of technologies and risk knowledge, and the Nation's ability to pay may jeopardize the Department's environmental quality goals.

Critical Success Factors

The Department's five business lines represent the activities the Department will be engaged in. However, a successful business requires much more than understanding products and priorities. Critical to success is the integration of communication and trust; effective human resource management; a genuine concern for the environment, safety, and health of our workers and the public; and highly efficient management practices into everything we do. The following areas discuss these critical success factors.

Communication and Trust. The Department is undergoing a transformation from a secretive, weapons producing agency, little understood outside of Washington, to a service-oriented, customer-driven leader in science, technology, and environmental management. That transformation mandates a change in culture—a new emphasis on openness, communication and trust. Only an open and accountable government will achieve the level of public trust needed to address complex problems such as the management of plutonium and redirection of our national laboratories.

Every action DOE takes from now on must be considered a communication that can enhance or hinder the trust of the American people. Behaviors that encourage trust to grow can and must be required. We must be responsive to the growing public demand for the declassification of millions of pages of DOE documents with a special focus on nuclear weapons testing, experimentation with radioactive materials, and environmental releases and contamination.

Trust results from open and honest communication.

Human Resources. The Department seeks greater alignment of resources with agency priorities and increased diversification of the workforce, including gender, ethnicity, age, and skills. This diversification will bring new thinking and perspectives that heretofore have not had a voice in departmental decision-making. We seek flat organizations, fewer levels of management, empowered employees, and lessened regulation by oversight agencies so we can rapidly respond to today's challenges and meet public needs.

Barriers to achieving human resources' goals include resource constraints, a complex personnel system, competition for diversity talent, limited management commitment and accountability, lack of trust, individual over corporate interest, and lack of an effective mechanism to reallocate resources and retrain individuals.

Environment, Safety, and Health. In addition to the Department's environmental problems, safety and health concerns are formidable. The Department has limited public health expertise, insufficient worker medical surveillance programs, and inadequate safety training in the workplace. We are committed to improve policies, programs, and professional expertise in key areas such as occupational medicine, risk management, and data management.

We are shifting from a reactive approach to environment, safety, and health to one that emphasizes prevention. All departmental businesses are proactively ensuring that there is no compromise in public and worker safety.

Increasing external regulation is an opportunity to improve the Department's performance and credibility. Meaningful and value-added independent regulation can serve to clarify requirements and can provide a framework for more disciplined internal responsibilities and actions. External regulation promotes transparency and public involvement. Efforts are accelerating to improve information access, "open up" the Department's records related to environment, safety and health, and improve external relationships.

Management Practices. The Department has over 800 separate systems for managing its operations, which limit the Department's flexibility. DOE must become more streamlined and agile. Change is needed in information systems, procurement and contracting, planning and budgeting, financial management, directives management, and project and facilities management.

The Department has not been customer oriented. Meeting or exceeding all of our customers' reasonable expectations requires integrated, cost-effective, "open" management systems that are easy to understand and free of manipulation.

The Department will continue to contribute to the Administration's deficit reduction objectives through savings resulting from the realignment of its mission priorities, its focus on customer service and total quality management, its contract reform initiatives, and its leadership role in support of the reinventing government initiative. In short, we intend to achieve greater results with less money.

THE BUSINESS STRATEGIES

The efforts of the Department's five business strategic planning teams are summarized in this section. The action plans to achieve these goals are included in each of the team's actual strategic plans.

INDUSTRIAL COMPETITIVENESS

The Department of Energy has an essential role to play in assisting U.S. economic competitiveness as a result of its unique laboratory system and research and development (R&D) capabilities. DOE's laboratories and facilities have expertise in many areas that are critical to major high-technology industries and services and to reconciling economic and environmental goals.

DOE's core competencies include energy and environmental technologies, advanced materials development, high-performance computing and communications, and advanced manufacturing. These competencies have provided the basis for unprecedented growth over the past few years in collaborative research and development activities between the

Partnership: General Motors, Advanced Engineering Technology Group, and Los Alamos National Laboratory executives describe a fuel cell being jointly developed for automotive use to President Clinton and Secretary O'Leary.

Department and the private sector. Although most of these collaborative agreements are multi-year partnerships that were initiated in only the past two years, many already have proven successful at generating commercial products, improving market share, and creating jobs.

Help industry sustain long-term economic growth that has created high-wage jobs and a cleaner environment.

Through these interactions, the Department and the laboratories have gained a great deal of experience that now must form the basis for moving to a new, highly-integrated, and strategic approach for DOE's overall interactions with the private sector.

VISION

In the year 2010, the Department of Energy uses its leadership in energy, science, and technology to help industry sustain long-term economic growth that has created high-wage jobs and a cleaner environment. Because of our record of success, industry seeks out DOE as an innovative and productive partner. Working together, DOE, industry, and other Federal agencies have made the U.S. economy the most productive in the world in its use of energy, material, and human resources.

GOAL 1

Help industry shift from waste management to resource efficiency and pollution prevention.

STRATEGIES

- Develop resource efficient, pollution prevention, renewable energy, and other clean technologies.
- Coordinate Federal activities to establish roles and responsibilities.
- Help industry expand global market share.
- Work with the technological, financial, and regulatory communities to overcome barriers to the adoption of clean technologies.

SUCCESS INDICATORS

- Decrease in energy use, amount of raw materials, and generation of waste per unit of Gross Domestic Product.
- Increase in U.S. industries' share of global market for clean technologies.

GOAL 2

Establish DOE as industry's R&D provider of choice in its areas of scientific and technical competency.

STRATEGIES

- Develop integrated R&D program plans with industry, including technology roadmaps.
- Maximize integration of R&D partnerships across DOE through co-planning and co-funding.
- Develop consistent, reliable, standardized, and fair policies and procedures across the Department and its facilities so that access by potential partners is simplified.
- Develop a communications strategy that helps industry know which resources are available within the Department and where.
- Provide timely and reliable technology partnership funding, and ensure prompt decision-making regarding such funding, across all departmental programs and offices.

SUCCESS INDICATORS

- Increase in number of jobs created and value of products created from R&D partnerships.
- Increase in total annual amount of non-Federal resources applied to mission-related research through R&D partnerships.
- Increase in number of new or extended agreements entered into by past participants as a measure of repeat business.
- High marks on industrial partner surveys of DOE performance.

GOAL 3

Maintain core competencies and leverage resources by partnering with private sector and other agencies for dual benefit, two-way technology exchange.

STRATEGIES

- Develop a budget structure and business strategies that support DOE's technology infrastructure.
- Work with the Administration and Congress to advance dual-benefit work with industry.
- Make access to DOE facilities easier for Federal, State, and local agencies.
- Establish regional programs to retrain and maintain skills of national security and other workers affected by program transitions.

SUCCESS INDICATORS

- Increase in number and value of new or enhanced products/processes created and used by industry.

GOAL 4

Accelerate national use of available and emerging competitive technologies, processes, and practices.

STRATEGIES

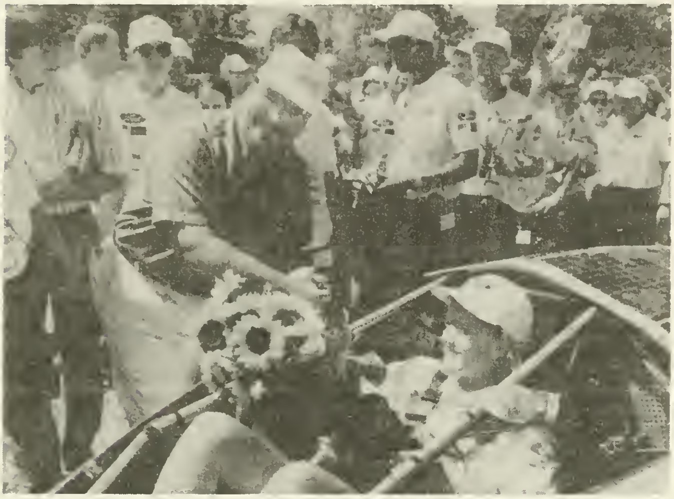
- Make DOE laboratories and facilities available as an integrated technical resource for existing manufacturing extension and technology outreach systems, such as those managed by the Department of Commerce.
- Develop, test, and pursue a portfolio of deployment programs.
- Work with other agencies to address institutional barriers.

SUCCESS INDICATORS

- Increase in degree of customer satisfaction reported by program participants.
- Increase in number of businesses accessing informational and/or technical assistance through deployment programs and number of repeat customers.
- Increase in geographical distribution and diversity of businesses reached.

ENERGY RESOURCES

Energy fuels a competitive economy. Strategic energy policy can lead to the creation of high-wage jobs, an improved national and global environment, and reduced vulnerability to supply disruptions. In *A Vision of Change for America*, President Clinton states, "The Administration will launch initiatives to develop new, clean, renewable energy sources that cost less and preserve the environment. We will also encourage energy efficiency and conservation to lower the energy bill of middle-class Americans, and lessen our vulnerability to events outside our control."



Sunrayce '93; congratulating a driver for University of Michigan's winning team. DOE sponsors this biennial student built solar car cross-country collegiate competition, which challenges science, math, and engineering students and promotes scientific competition.

VISION

Energy services are needed for a wide range of valued human activities. To meet these needs, they must be reliably and fairly available at low environmental and economic costs. In our vision for the year 2010 and beyond, the United States will be a worldwide leader in the development, application, and export of sustainable, environmentally attractive and economically competitive energy systems—and will have in place a flexible, clean, efficient, and equitable system of energy supply and end-use, with minimum vulnerability to disruption.

GOAL I

Enhance energy productivity to strengthen the United States economy and improve living standards.

STRATEGIES

- Accelerate energy efficiency in all sectors cost-effectively.
- Promote programs that will establish the United States as a world leader in developing and deploying energy technologies and services throughout the world.
- Achieve a major gain in the value of exports of energy technologies and services compared to imports.

- Emphasize and promote more open and efficient energy markets, reflective of social costs.

SUCCESS INDICATORS

- Amount of energy saved.
- Reduction of energy use per dollar of U.S. Gross Domestic Product.
- Increase in total jobs created directly and indirectly by DOE investments.
- Total increase in U.S. Gross Domestic Product created directly and indirectly by DOE investments.

GOAL 2

Ensure reliable energy services with reduced vulnerability to energy price and supply volatility.

STRATEGIES

- Facilitate the acceptance of greater diversity of competitive energy sources and technologies into the marketplace.
- Increase reliance on risk-sharing mechanisms using a systems approach (full life-cycle costs).
- Increase efficiencies in energy supply, conversion, and utilization through financial and regulatory assistance and incentives.
- Promote flexibility in the energy sector.

SUCCESS INDICATORS

- Increased penetration of alternative transportation fuels by the year 2010.
- Reduction of oil use per dollar of U.S. Gross Domestic Product.
- Increased penetration of natural gas.
- Maintenance of all energy options to ensure flexibility.
- Increased level of fuel-switching capabilities among energy fuels.
- Adequate emergency planning and liquid fuel reserves to mitigate severe impacts of oil price and supply disruptions.

GOAL 3

Reduce adverse environmental impacts associated with energy production, delivery, and use.

STRATEGIES

- Reduce energy-related emissions of greenhouse gases below 1990 levels by the year 2000 through development and deployment of efficiency-enhancing and alternate-energy technologies and processes and through continued operation of safe, economical nuclear powerplants.
- Reduce regional and local impacts of U.S. energy-related emissions and discharges through the development and deployment of lower emission energy transformation, delivery, and end-use technologies.
- License and operate a repository for the Nation's spent nuclear fuel and other high-level radioactive waste.
- Improve the global environment through policy leadership at home and programs for the export of advanced energy and environmental technologies.

SUCCESS INDICATORS

- Increase in marker penetration of energy technologies that reduce greenhouse gases, sulphur dioxide, nitrogen oxides, and other critical pollutants.
- Increase in number of alternative fuel vehicles in use in the commercial transportation sector.

- By 1995, determine a long-term waste repository program funding policy and profile, rebaseline the Yucca Mountain site suitability effort, and, by 1996, define the departmental role regarding nuclear spent fuel interim storage at reactor sites and in the Federal waste management system.
- Increase in percentage of U.S. market share in the export of clean energy technologies.

GOAL 4

Promote economic and regional equity for all Americans through changes in the systems of energy production, delivery, and end-use.

STRATEGIES

- Develop tax policies and fund programs that ensure universal access to affordable energy services.
- Develop policies that eliminate disproportionate adverse environmental effects of energy systems on geographic regions, minority and low-income groups, and local communities.

SUCCESS INDICATORS

- Increase in percentage of public utility commission decisions giving explicit recognition to equity issues.
- Increase in number of low-income households weatherized.
- Decrease in ratio of energy system costs to benefits, by population groups.
- Increase in equity considerations in the siting of new energy systems.

SCIENCE AND TECHNOLOGY

First-class basic and applied science are needed to advance industrial competitiveness, clean energy resources, national security, and environmental quality through technology leadership. The Administration's technology plan of February 23, 1993, recognizes this by setting a key goal for the Nation of world leadership in science, mathematics, and engineering.

VISION

Science and Technology provide the knowledge that drives our future. World-class scientists and engineers; working in world-class facilities on leading-edge problems will spawn the knowledge that revolutionizes technology—the knowledge and technology that others need to achieve their vision.

GOAL 1

Provide the science and technology core competencies that enable DOE's other businesses to succeed in their missions.

STRATEGIES

- Maintain and validate program excellence and balance in basic science and applied science that supports the energy, environment, national security, and industrial competitiveness missions.
- Fully utilize research facilities, as appropriate, to reduce unit costs.
- Develop innovative options for funding R&D partnerships.
- Build on and nurture appropriate DOE core competencies.
- Encourage flexibility in research programs.

DOE's advanced photon source will provide research opportunities that could lead to higher quality products that last longer. When experiments begin in 1996, it will produce x-ray beams one trillion times more brilliant than conventional x-ray machines. Joint research teams from industrial, university, and government labs will build and operate research facilities at the site.

- Improve communications and establish partnerships among suppliers, customers, and stakeholders.

SUCCESS INDICATORS

- Quality of science, as indicated by favorable outside peer reviews and judgments of expert advisory committees.
- Closer linkage of energy research programs to DOE's energy, national security, and environmental technology programs.
- Maintain or improve the performance and preeminence of the Department's large research facilities, as indicated by the reliable and cost-effective operation and maintenance of world-class research facilities and endorsements from the research users.
- Increase in DOE's influence in developing the information superhighway.

GOAL 2

Provide new insights into the nature of matter and energy, address challenging problems, and create a climate in which breakthroughs occur.

STRATEGIES

- Maintain and validate program excellence and balance in high energy and nuclear physics and other fundamental sciences.
- Ensure a flow of knowledge into society by striking a reasonable balance in support of principal investigators, new facilities, and existing facility operations.

- Partner with universities and the international scientific community to maximize benefits.
- Ensure adequate support for priorities by utilizing management systems that reflect state-of-the-art business practices.
- Earn confidence by making realistic claims and delivering on what is promised.

SUCCESS INDICATORS

- Quality of science and innovativeness of research, as indicated by favorable outside peer review and expert advisory committee reports.
- Sustained achievement in advancing knowledge, as indicated by the impact of knowledge gained in other scientific and technological fields, and the number of publications, citations, and awards generated by DOE-supported research.
- Optimal operation of major experimental facilities, as indicated by operating efficiency and performance benchmarking.
- Development of new technologies that advance fundamental research capabilities and reduce costs, as indicated by new scientific and technology programs that emerge from the research.

GOAL 3

Construct leading-edge experiments and user facilities on schedule, within budget, and in a safe and environmentally responsible manner.

STRATEGIES

- Ensure that all facilities are "best-in-class" by using total quality management benchmark processes and state-of-the-art management information systems.
- Develop an oversight process that involves affected parties in a team approach to facility review.
- Employ risk-based cost benefit analysis to help set priorities and make decisions.
- Involve the international community to develop a global research facility network.
- Use innovative technologies to reduce costs.

SUCCESS INDICATORS

- Preeminence of facilities, as indicated by support by DOE and users, comparison with other facilities worldwide, the nature and extent of university and industrial involvement, and investment by users in the facility.
- Improved performance of facilities, as indicated by meeting original target performance plans and meeting expectations of users.
- Achieving construction cost and schedule milestones, as agreed upon prior to construction.
- Establishment and documentation of methods for determining and ensuring the level of and compliance with environmental, safety, and health standards.

GOAL 4

Add value to the U.S. economy through the application of new and improved technologies.

STRATEGIES

- Strengthen alignment between DOE programs and industry needs. Adequately plan and fund partnerships with industry.
- Streamline and improve the technology transfer process and learn how to work better with small businesses.

- Provide adequate funding for partnerships with industry.
- Provide adequate support for applied research and technology development.
- Forge links with other agencies and academia to leverage research benefits and avoid duplication.
- Strengthen links between laboratories.
- Establish national laboratories as regional centers to stimulate industrial competitiveness.

SUCCESS INDICATORS

- Increase in number and magnitude of cooperative activities with industry.
- Increase in technologies developed and deployed as a result of partnerships with industry.
- Increase in number of new projects at companies and problems solved or avoided that can be attributed to interactions with DOE programs.
- Increased leverage of government dollars with private sector funding.

GOAL 5

Help provide a technically trained and diverse workforce for the Nation and enhance American scientific and technical literacy, especially in energy, the environment, and the impact of science on the economy.

STRATEGIES

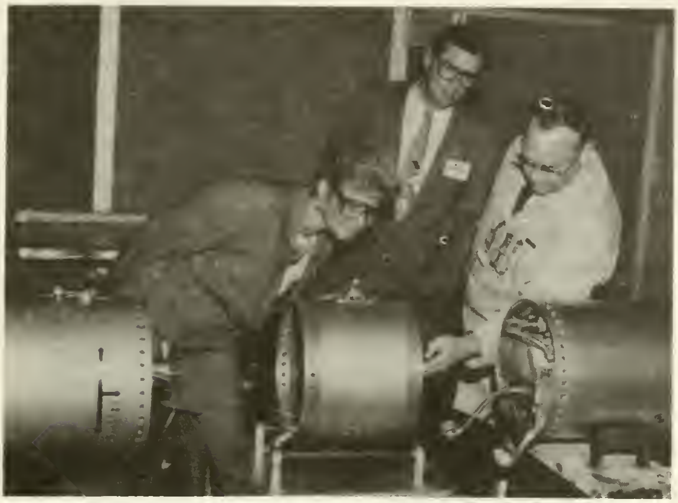
- Increase DOE participation in pre-college mathematics and science and continuing education programs.
- Increase DOE programs for teachers and students in the Department's laboratories.
- Support and encourage greater involvement by DOE science and technology staff in educational and community outreach programs.
- Expand opportunities in science at an early age for traditionally under-represented groups.
- Provide scientific and technical energy information through dissemination mechanisms responsive to customer needs, such as teacher networks, use of electronic networks, public television, and outreach vans and buses.

SUCCESS INDICATORS

- Improved scientific literacy of the American public and workers and increased participation of traditionally under-represented groups in technical education programs.
- Improved technical effectiveness of DOE and contractor employees, as indicated by work performance and community outreach.
- Increases in level of customer demand for departmental information resources and more positive feedback from information users.

NATIONAL SECURITY

For almost fifty years, our national security has relied on the deterrent provided by nuclear weapons. The diminishing strategic military threat, due to the end of the Cold War and break-up of the Soviet Union, has provided the opportunity to redirect priorities from weapons production activities to other critical missions. At the same time, the Nation continues to rely on its nuclear deterrent, including nuclear powered warships, to fulfill critical national security missions. Their continued safe and effective operations are essential to national security.



Reducing the nuclear danger: Secretary O'Leary and U.S. Representative Bill Sarpalius of Texas are briefed by Pantex plant training specialist Jim Dugger during a '93 visit. Pantex plays a role in reducing the nuclear stockpile by safely and securely dismantling nuclear weapons, which contributes to the Administration's nonproliferation efforts.

Reducing the continuing and new nuclear dangers that the world faces, responding with programs that build upon and enhance the strengths of the DOE complex and the national laboratories, and emphasizing commitments to environment, safety, and health, are the essence of the Department's national security strategy.

VISION

Reducing the global nuclear danger. Accomplishing this vision means that by the year 2010:

- There will be fewer nuclear weapons worldwide.
- The stockpile will continue to be safe, secure, and reliable—without underground nuclear testing.
- Nuclear weapons-capable materials will be safe, secure, and headed for final disposition worldwide.
- The Department's national security infrastructure will continue to be a full participant in U.S. nonproliferation efforts.
- The DOE national security enterprise will be small, cost-effective, flexible, and environmentally sound.
- The Naval Reactors program will continue with, and enhance, the policies and practices that have achieved a worldwide reputation for excellence and safety.

GOAL 1

Assure that DOE remains a full participant in preventing the spread of nuclear weapons, materials, and expertise, and the preeminent agency in providing the technology to do this.

STRATEGIES

- Maintain national recognition of DOE as the preeminent research and development organization.
- Determine customer requirements.
- Maintain close coordination with other policy and research and development organizations addressing nonproliferation and arms control challenges.

SUCCESS INDICATORS

- Increase in frequency with which customers call DOE for support in arms control and nonproliferation efforts.
- Increase in number and quality of research and development initiatives completed/applied and decrease in time from concept to application.
- Increase in percentage of research and development efforts for which there are specific applications and customers.

GOAL 2

Maintain nuclear weapons technology and competence that are responsive to national security needs—within expected fiscal constraints.

STRATEGIES

- Continue maintenance and retrofit capability for the current stockpile.
- Enhance the surveillance program.
- Develop and implement a stockpile stewardship program to assure confidence that the stockpile remains safe, secure, and reliable—without underground nuclear testing.

SUCCESS INDICATORS

- Meeting schedules for stockpile surveillance evaluations, regular maintenance requirements, and experiments to assess reliability and safety of the stockpile.
- Improvement in time required to respond to unanticipated stockpile problems.
- Time required to return to testing, if directed, is acceptable.
- Compliance with environmental, safety, security, and health requirements.
- Meeting design, construction, and operations schedules for the facilities in the stockpile stewardship program.
- Success of computer codes to evaluate experimental results.
- Ability to match past tests with experiments in new facilities.

GOAL 3

Reduce the worldwide nuclear stockpile by safely and securely dismantling thousands of nuclear weapons. Support safe, environmentally sound control and disposition of nuclear materials and components that could contribute to proliferation by providing capabilities, technologies, and systems.

STRATEGIES

- Develop and implement an approach for processing and storage of materials returned from the stockpile.
- Implement "transparency" through measures that include international inspections and bilateral agreements providing for the confirmation of declared inventories of materials returned from weapons stockpiles and

the methods for their storage, processing, and disposition.

- Work within U.S. Government, with other countries, and with stakeholders to plan and implement prioritized, continuous improvements for environment, safety, and health, security, and cost-effectiveness of dismantlement and disposition operations.

SUCCESS INDICATORS

- Degree to which DOE's capacity for dismantlement meets requirements.
- Quantity of excess weapons fissile materials that is accounted for and/or subject to international verification.
- Decrease in number of environmental, safety, health, and security-related incidents associated with dismantlement.

GOAL 4

Achieve continual enhancement of the technology infrastructure and core competencies for execution of the national security mission while further assisting industrial competitiveness.

STRATEGIES

- Develop and implement a process to assess the adequacy of the science and technology base for national security and industrial competitiveness.
- Work with customers to determine their requirements, interests, and conditions for long-term support.

SUCCESS INDICATORS

- Quality of the program, as measured by review groups.
- Increase in citations and R&D awards.
- Increase in number of proposals for partnerships and extent of reduction in processing time.
- Increase in overlap of technology infrastructure with industrial competitiveness requirements.

GOAL 5

Transform the DOE national security infrastructure to meet all current and future requirements for 1) management of nuclear weapons design, testing, and manufacturing technology, 2) safe, secure disposition of weapons capable materials, and 3) maintenance of arms control and related technologies. Make the infrastructure cost-effective, responsive, flexible, agile, and environmentally responsible.

STRATEGIES

- Use the programmatic environmental impact statement re-scoping process to define the scope of restructuring and assure integration of issues.
- Address local concerns about employment losses by promptly developing each site's programs for defense conversion/worker retraining.
- Integrate and revitalize the stockpile stewardship and technology infrastructure program to minimize technical risk and assure that national security capabilities remain "second to none."

SUCCESS INDICATORS

- A complex that is smaller, less diverse, more cost effective, secure, and environmentally responsible.
- Meeting the percentage of equipment relocated, facilities modified, construction completed, or processes qualified at receiver sites against the plan for nonnuclear consolidation.
- Office of Management and Budget and Congressional support for budget requests and outyear funding requirements needed to complete the approved plan are provided.

ENVIRONMENTAL QUALITY

The principal environmental quality objective—and the greatest challenge—of the Department of Energy is to eliminate the risks and imminent threats posed by past departmental activities and decisions. With the end of the Cold War, we have turned our focus to understanding and eliminating the enormous environmental problems created by the Department's historical mission of nuclear weapons production.

While we are just beginning to understand the scope and cost of the environmental degradation, the Department affirms the great need to eliminate risks and imminent threats to human health and the environment. We also affirm the need to minimize and prevent the pollution from on-going departmental activities.

VISION

The environmental quality vision is:

- There will be full incorporation of improved environmental quality considerations in DOE's daily operations and decisions to ensure no further degradation.
- The environmental, safety, and health risks at all DOE facilities will be well understood.
- DOE will manage, control, and/or return as much land as possible to alternative uses and ownership.
- DOE will be a world leader in environmental technology development and application.

Environmental Quality: workers at training sessions are taught to perform a radiological survey for contamination.

- DOE will promote the use of cleaner energy and production processes.

GOAL 1

Reduce uncertainties, prioritize risks, and eliminate threats of our activities to improve environmental quality.

STRATEGIES

- Characterize and assess all risks and threats to environment, safety, and health.
- Strengthen enforcement of environmental, safety, and health performance.
- Ensure releases are below regulatory limits and implement aggressive waste minimization and pollution prevention activities.
- Promote independently enforced, risk and health-based standards.

SUCCESS INDICATORS

- Releases are below regulatory limits and departmental requirements.
- Increased percentage of departmental land and facilities turned over for appropriate alternative use.
- Environmental, safety, and health performance at departmental facilities is better than that of private industry.
- All risks/threats are assessed and characterized.
- Enforcement of agreed-upon risk and health-based standards. ("How clean is clean?")
- Environmental enhancement opportunities are assessed and prioritized.

GOAL 2

By the year 2000, attain credibility and public trust and demonstrate openness.

STRATEGIES

- Improve overall access to information on departmental activities.
- Expedite Freedom of Information Act requests.
- Plan and encourage advisory boards for major DOE sites.

SUCCESS INDICATORS

- Increase in number of declassified documents.
- Decrease in number of new classified documents.
- More timely processing of Freedom of Information Act requests.
- Decrease in number and dollar amount of environmental fines and lawsuits.

GOAL 3

By 1996, be in control managerially and financially of environmental activities, and be demonstrably perceived as such by our stakeholders.

STRATEGIES

- Improve contract management and reduce costs through establishment of clear performance objectives and penalties.
- Increase the number of projects with fully defined scopes, schedules, and cost baselines.

SUCCESS INDICATORS

- Decrease in average life-cycle cost of contracts.
- Decrease in required rework of products.
- Increase in number of projects with fully defined scope, schedule, and cost baselines.

- Attainment of cost savings and productivity improvement in environmental quality activities.
- Increase in stakeholder satisfaction, based on opinion surveys.

GOAL 4

Achieve independent and credible regulation of departmental activities and facilities and eliminate conflicting requirements.

STRATEGIES

- Promote legislative actions to increase independent and cost-effective regulation of DOE activities.
- Participate in and strengthen interagency efforts to evaluate existing and proposed statutes (including the Atomic Energy Act) and work with Congress and the Executive Branch to implement legislative modification or requirements.
- Review existing internal directions, DOE Orders, tasking memoranda, and other mechanisms to eliminate overlap.

SUCCESS INDICATORS

- Established interagency task force drafts and submits legislation and works with Congress to secure enactment.
- Value-added external regulation is accomplished by the implementation of a systematic approach for transfer of responsibility for worker safety and health to the Occupational, Safety, and Health Administration.
- Measures associated with reducing conflicting regulations and internally generated mandates are identified and systematic implementation is initiated.
- Full compliance with environmental, safety, and health standards.

GOAL 5

By the year 2005, be a leading Federal agency in environmental technology development focused on the Nation's needs.

STRATEGIES

- Develop an integrated systems approach for environmental technology development.
- Establish an environmental technology coordination mechanism within the Department.
- Ensure that the United States becomes the major world supplier of environmental technology applications.

SUCCESS INDICATORS

- Increase in number of advanced environmental technologies used by Federal agencies.
- Increase in commercialization of advanced technologies.

THE CRITICAL SUCCESS FACTOR STRATEGIES

The previous strategies have described what the Department's five businesses are going to accomplish. The following sections describe the strategies for how the Department will conduct its operations.

COMMUNICATION AND TRUST

The Department of Energy has a unique responsibility to establish a relationship with the American people based on communication and trust. As the Federal agency entrusted with the Nation's nuclear weapons complex and resulting radioactive and hazardous wastes, the Department must deal honestly and fairly with the public it serves, to increase knowledge about its mission and activities, and reduce unwarranted fears. Habits that encourage communication and trust must become part of the agency's daily decision-making processes.

VISION

Trust in DOE's role in contributing to the U.S. science and technology base and energy policy, and in reducing the nuclear danger, results from open and honest communication of responsible action.

GOAL 1

The Department's vision, mission, performance, and contributions to science, technology, and national competitiveness in the global marketplace are recognized and valued.

STRATEGIES

- Ensure every communication reinforces DOE's identity.
- Develop a graphic device to identify DOE products.
- Produce a brief, clear, candid Annual Accomplishments Report, reflecting both successes and inadequacies, assessing and widely disseminating the degree to which DOE has fulfilled its vision.
- Develop a proactive Speakers' Bureau to provide speakers to community organizations and talk shows around the Nation.

SUCCESS INDICATORS

- Regular surveys show increase in customer and public awareness of DOE and its missions.
- The ratio of positive-to-negative media stories increases.

GOAL 2

DOE is trusted and trusting both internally and externally.

STRATEGIES

- Live up to our core values and vision ("walk our talk").
- Take customer feedback seriously.
- Use "validators" with public credibility (e.g., National Academy of Sciences, professional/technical societies, and respected public interest groups) to review DOE decisions.

- Use innovative partnerships to enhance public understanding and to accomplish DOE's mission.
- Make public access to information and facilities easier (establish a policy of openness).

SUCCESS INDICATORS

- Commitments are met.
- Customer survey results are applied to program planning initiatives and budgets.
- Partnerships are established and information is shared with other Federal agencies, State and local governments, Native American Nations, industry, public interest organizations, and academic institutions.
- Much national security information is declassified and future classification is minimized.

GOAL 3

DOE communications (both internal and external) are timely and of high quality.

STRATEGIES

- Identify end use and goals of all communications products and create quality products to meet those goals.
- Understand customers, and determine and respond to their communication needs.
- Institutionalize training in communication and customer service skills.
- Minimize public's need to invoke the Freedom of Information Act to obtain information.

SUCCESS INDICATORS

- User-friendly public inquiry system is developed (1-800 number).
- Overall customer satisfaction (internal and external) with transactions with members of the DOE family is high.
- "One-stop" public access system for obtaining DOE reports and documents is established.
- Ineffective products are eliminated and communication plan is adopted to ensure the need for and responsiveness of future products.

GOAL 4

DOE listens and responds to its customers and partners in a fair and open process that encourages participation.

STRATEGIES

- Conduct public participation in good faith.
- Make participation with public and use of customer feedback a routine and valued practice.
- Ensure that all DOE officials designated as liaisons to customers act not only as communicators (or defenders) of DOE policy, but as conduits and advocates of customer reactions.
- Establish "Secretary's Annual Excellence in Public Involvement Award" to be given to organizations that creatively and effectively implement public involvement initiatives.

SUCCESS INDICATORS

- Officials who deal directly with the public are empowered to make commitments and explain why decisions are made.
- Increase in percentage of customer suggestions that become DOE policy.
- Decrease in number of lawsuits filed by unsatisfied customers.

- First "Secretary's Annual Excellence in Public Involvement Award" is presented in 1994.

GOAL 5

All members of the DOE family serve the communication needs of their internal and external customers knowledgeably and responsibly.

STRATEGIES

- Take full advantage of new technology to provide quality communications internally and externally by 1999.
- Develop a plan to take advantage of current technology—computer, optical, document management, telecommunications—to improve communications, internally and externally.
- Develop a real-time reference base of information—e.g., speech information, visual aids—that can be readily accessed by all members of the DOE family.
- Develop a technical data base accessible by external and internal customers that addresses budgets, contracts, grants, environmental, safety, and health programs, waste management and defense activities, energy technologies, science, and energy-related consumer information.

SUCCESS INDICATORS

- Technology implementation plans are incorporated in planning and budget decisions.
- DOE-wide electronic mail systems are integrated so all personnel can communicate easily.
- Data base system is automated and accessible by DOE family and external customers.
- High percentage of inquiries and investigations is satisfied by output from data bases.

GOAL 6

All members of the DOE family see themselves as part of a community of service sharing a common vision and applying core values.

STRATEGIES

- Communicate short, clear, focused statements of DOE mission and vision to DOE family.
- Modify the recognition system to reward teamwork.
- Train all employees in communications, team building skills, listening skills, and the Department's core values.
- Provide flexibility in the work schedule for participation in professional and community organizations.

SUCCESS INDICATORS

- Improvement in morale and pride in the Department, as measured by increased productivity and number of successfully adopted suggestions.
- Continuous quality improvement processes are established and evaluated regularly.

HUMAN RESOURCES

People are our most important resource. The more successful our people are, the more successful the organization can be. Our human resources future will determine the Department's future.

VISION

We are an energized team of creative and dedicated people achieving departmental excellence.

GOAL 1

Align human resources with departmental priorities and requirements.

STRATEGIES

- Assure there is a common understanding of the Department's priorities and requirements.
- Allocate human resources consistent with the Department's priorities and requirements.
- Provide incentives and support for doing more with less.

SUCCESS INDICATORS

- Agreement is reached within the Department regarding workforce planning and analysis strategy.
- Skills bank is established.
- Target number of employees retrained/reassigned is reached.

People are our most important resource.

GOAL 2

Ensure a diverse and talented workforce.

STRATEGIES

- Achieve the benefits afforded by a diverse and talented workforce through strengthened management commitment and accountability.

SUCCESS INDICATORS

- Increase in percentage of minorities, women, and persons with disabilities in the workforce and in management positions.
- Enhanced training is established for managers and supervisors.
- Increased participation in programs such as upward mobility.

GOAL 3

Develop and maintain a well trained and versatile workforce.

STRATEGIES

- Institutionalize strategic planning for training and development.
- Establish an integrated career partnership system.
- Develop and implement a management training curriculum.
- Develop and implement a departmental technical intern program.

SUCCESS INDICATORS

- Increase in number of career tracks and mentoring relationships established.
- Strategic planning process for training and development is established.
- Increase in number of individual development plans.

GOAL 4

Ensure a highly motivated workforce.

STRATEGIES

- Reduce human resources regulations and practices for optimum flexibility.
- Foster and institutionalize the core values of the Department.

SUCCESS INDICATORS

- Streamlined human resources processes.
- Improved morale as measured by employee surveys.

- Simplified performance appraisal system and an equitable awards program implemented.

GOAL 5

Use quality management principles in all aspects of the way we do business.

STRATEGIES

- Build and institutionalize a total quality management infrastructure.
- Focus on internal and external customer satisfaction.
- Identify and continuously improve human resources processes.

SUCCESS INDICATORS

- Increase in number of organizations engaged in total quality management implementation.
- Increase in number of employees involved in process improvement teams.
- Decrease in number of internal/external customer complaints.

ENVIRONMENT, SAFETY, AND HEALTH

Ensuring the safety and health of workers and the public and the protection and restoration of the environment are fundamental responsibilities of the Department of Energy. Excellence in environmental, safety, and health activities and timely implementation are critical to the success of each of the Department's businesses. It is the foundation of the Department's largest program, environmental management.

VISION

The hallmark and highest priority of all our activities is daily excellence in the protection of the worker, the public, and the environment. Fundamental to the attainment of this vision are personal commitment, mutual trust, open communications, continuous improvement, and full involvement of all interested parties.

GOAL 1

Empower workers and take other necessary actions to prevent all serious injuries and all fatalities, and to eliminate all worker exposures and environmental releases in excess of established limits. By eliminating these exposures and releases, reduce the incidence of illness among workers and the public, and prevent damage to the environment.

We respect the environment.

STRATEGIES

- Establish effective employee complaint and employee suggestion processes, and establish labor/management safety and health committees to cover all workers at all sites.
- Train individuals to appropriate and established levels of job competency and proficiency.
- Establish a consistent and effective approach to adequately resolve common DOE-wide safety and health problems.
- Modify prime contractors' contracts to strengthen accountability for safety and health, including performance of all subcontractors in these areas.
- Establish an effective medical surveillance program at all sites and

Acid rain research: college intern measures rates of leaf photosynthesis with a field portable gas analyzer system at DOE national lab. Measurements have been important indicators of pollutant effects on plant growth.

utilize it to improve conduct of operations and worker health and safety.

- Develop DOE-wide definitions for serious injury/illness and other appropriate health indicators, and develop information management systems for health outcome data.
- Implement a safety analysis system for all new technologies, including system-specific Standard Operating Procedures, training prior to start-up of new technologies, and clearly defined roles and responsibilities within DOE.

SUCCESS INDICATORS

- All worker safety and health complaints are acknowledged within 48 hours and resolved in a timely fashion.
- Number of complaints rises over the first year and declines thereafter.
- Decrease in number of fatalities, serious injuries, incidents of illness, and exposures and releases (in excess of established limits).

GOAL 2

Ensure there are specific environmental, safety, and health performance requirements for DOE activities which are the basis for measuring progress toward continuous improvement.

STRATEGIES

- With stakeholder input, develop and apportion performance elements and benchmark DOE's performance against other government agencies and the private sector that have comparable activities.
- Establish a focus group to define accountability and ownership of the performance indicators and implement recommendations of the focus group.
- Develop a system to achieve consistent management tracking of environmental, safety, and health issues and performance.
- Develop a process to systematically define health/risk-based standards and requirements.

SUCCESS INDICATORS

- Performance elements are in place and measured.
- All performance indicators have owners who are accountable.
- Number of health/risk-based standards increases over time.
- Volume of facility effluents decreases over time.

GOAL 3

Establish clear environmental, safety, and health priorities and manage all activities in proactive ways that effectively and significantly increase protection to the environment and to public and worker safety and health.

STRATEGIES

- Establish a sound departmental approach to environmental, safety, and health priority setting, and define clear and accountable indicators to gauge success in satisfying established priorities.
- Revise DOE budget processes to account for environmental, safety, and health expenditures and priorities, require justification of needs, and provide the framework for incorporating environmental, safety, and health planning into all phases of the budget cycle.

SUCCESS INDICATORS

- Environmental, safety, and health "high priority" needs are funded.
- Decrease in proportion of unplanned (reactive) versus planned expenditures in budget cycle.
- Decrease in time to complete National Environmental Policy Act actions.

GOAL 4

Demonstrate respectable performance related to environmental protection and worker/public safety and health. Ensure related DOE information is reliable, comprehensive, and available through an open process. As a result, earn public credibility.

STRATEGIES

- Commit to seek independent and credible external regulation as soon as possible, and establish working groups (including interagency) to plan for the transition and implementation.
- Declassify as many documents as possible, and seek resources to improve information access and dissemination, including reduced response time for information requests. Involve local and State governments in information dissemination/reliability processes.
- Participate and provide leadership in Administration efforts to address issues related to human experimentation conducted by governmental agencies.
- Improve reliability of information through willingness to provide raw data and to seek outside expert review.
- Conduct stakeholder meetings and operate in as open an environment as possible. Seek customer input in decision-making processes and provide feedback.
- Educate the public, media, and the Congress on DOE's environmental, safety, and health issues and progress.

SUCCESS INDICATORS

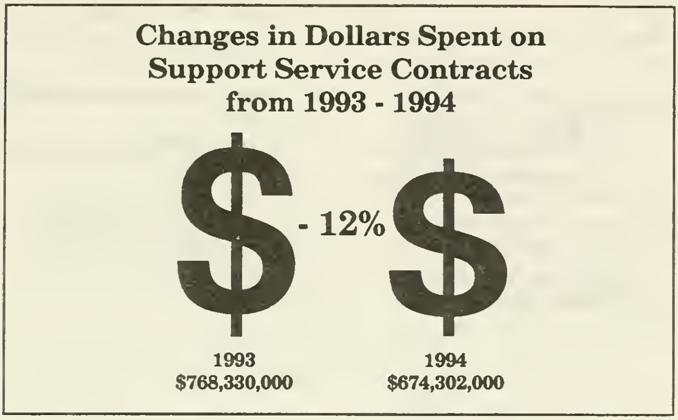
- DOE credibility improves in the polls and good press increases.
- Increase in ratio of external to internal oversight.
- Increase in level of stakeholder involvement and two-way feedback.
- Increase of available unclassified data.
- Decrease in number of Freedom of Information Act requests and Department's response time for current information.

MANAGEMENT PRACTICES

The Department has an urgent need to embrace the best management practices to improve processes and customer satisfaction, prevent defects, and eliminate waste. It has an $18 billion budget, over 20,000 employees, and a large number of research laboratories, facilities, and Operations Offices. It oversees large-scale special operations such as the processing and storage of nuclear materials and the production of power for large regions of the country. It is one of the largest owners of public facilities in the world. Still, it contracts out about 85 percent of its work by dollar amount.

The Department will be viewed as "best in class."

The management of such an operation must have a coherent and well structured architecture so that it may more effectively



Secretary O'Leary presented her contract reform report on February 3, designed to make contractors more accountable for performance, increase competition for DOE business, and tighten cost controls.

meet the requirements of its customers and its national and international responsibilities.

VISION

The Department will be viewed as "best in class" in its management practices. Customer expectations of its management practices will be met or exceeded. People will be empowered through integrated and open management systems that are results-oriented and cost-effective.

GOAL 1

Ensure management practices meet or exceed customer expectations.

STRATEGIES

- Determine customer requirements with customer participation.
- Reconcile customer requirements with statutory requirements and resource limits.

SUCCESS INDICATORS

- Increases in customer/stakeholder satisfaction levels.

GOAL 2

Ensure management practices are driven by, and supportive of, mission needs.

STRATEGIES

- Define management practice owners and practices to be improved.
- Clarify roles and responsibilities for decision-making.

SUCCESS INDICATORS

- Meeting action plan schedules.
- Increase in number of decision levels, regulations, and processes eliminated.
- Increase in number of systems improvements implemented.
- Contract dollars saved.

GOAL 3

Ensure management practices mirror our best public and private sector counterparts.

STRATEGIES

- Use total quality management and DOE-wide benchmarking to reengineer and integrate management practices for continuous improvement.
- Implement a comprehensive training/education program.
- Use award criteria as guidelines for continuous improvements.

SUCCESS INDICATORS

- Increase in effectiveness, as measured by timeliness, accuracy, and costs.
- Decrease in time required to implement changes.
- Increase in number of employees trained in management practices.
- Improvements in management controls (e.g., by Federal Manager's Financial Integrity Act Reports and General Accounting Office/Inspector General Audits).

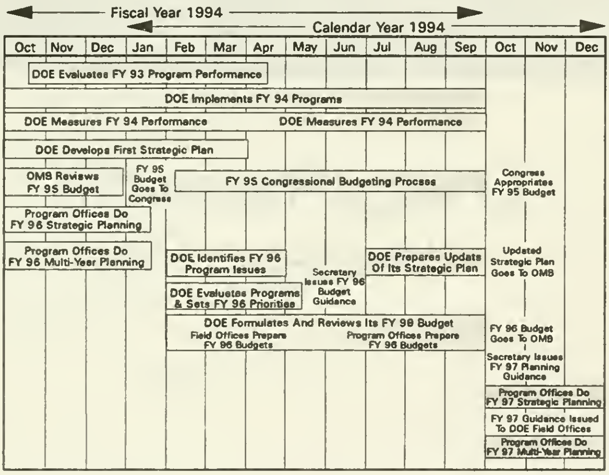
UPDATING THE STRATEGIC PLAN

This document represents DOE's long-range strategy. The specific details of how the Department will achieve its goals and objectives are described in the strategic plans, multi-year program plans, operational plans, and budgets prepared by the program offices and laboratories. Success will be measured against performance indicators, some of which have already been presented.

A calendar of the Department's key planning and budgeting efforts and their relationship with the Office of Management and Budget and Congressional budget processes are shown below. During any given year, the Department is addressing planning, budgeting, and program evaluation activities that span four separate fiscal years.

This strategic plan represents work in progress. The future will be different than we picture it today, with new technologies, new laws, new barriers, and new opportunities. It is essential that we anticipate and accommodate such change. Strategic planning is therefore a continuous process; our plan will be reviewed at least annually and revised as appropriate. An updated plan will be provided to the Congress each year along with the President's annual budget submission.

Schedule for Strategic Planning and Budgeting


Fiscal Year 1994
Calendar Year 1994
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
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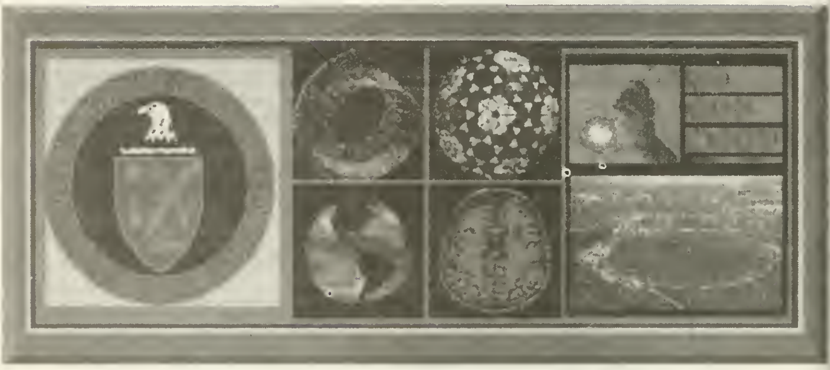
Jul
Aug
Sep
Oct
Nov
Dec
DOE Evaluates FY 93 Program Performance
DOE Implements FY 94 Programs
DOE Measures FY 94 Performance
DOE Measures FY 94 Performance
DOE Develops First Strategic Plan
OMB Reviews FY 95 Budget
FY 95 Budget Goes To Congress
FY 95 Congressional Budgeting Process
Congress Appropriates FY 95 Budget
Program Offices Do FY 96 Strategic Planning
Program Offices Do FY 96 Multi-Year Planning
DOE Identifies FY 96 Program Issues
Secretary Issues FY 96 Budget Guidance
DOE Prepares Update Of Its Strategic Plan
Updated Strategic Plan Goes To OMB
DOE Evaluates Programs & Sets FY 96 Priorities
DOE Formulates And Reviews Its FY 96 Budget
Field Offices Prepare FY 96 Budgets
Program Offices Prepare FY 96 Budgets
FY 96 Budget Goes To OMB
Secretary Issues FY 97 Planning Guidance
Program Offices Do FY 97 Strategic Planning
FY 97 Guidance Issued To DOE Field Offices
Program Offices Do FY 97 Multi-Year Planning

DOE/ER-0656

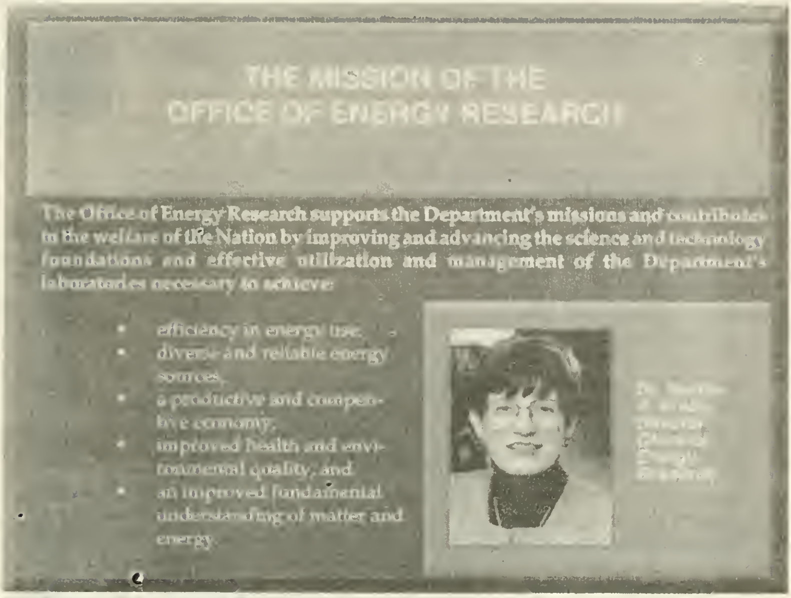
The Office of Energy Research

U.S. Department of Energy



Energy Research Strategic Plan

August 1995



THE MISSION OF THE OFFICE OF ENERGY RESEARCH

The Office of Energy Research supports the Department's missions and contributes to the welfare of the Nation by improving and advancing the science and technology foundations and effective utilization and management of the Department's laboratories necessary to achieve:

- efficiency in energy use,
- diverse and reliable energy sources,
- a productive and competitive economy,
- improved health and environmental quality, and
- an improved fundamental understanding of matter and energy.

Dr. Martha
A. Krebs
Director,
Office of
Energy
Research

Printed with soy ink on recycled paper

OUR PROGRAMS

Research and development is an essential element of economic prosperity and a traditional source of strength for the U.S. economy. During the past two decades, the way of introducing technological developments into the national economy has changed steadily.

Previously, industry did most long-term technology development and some basic research with private funding. Today, the Nation's industry relies mostly on federally-funded research to provide the knowledge base that leads to new technologies and economic growth. In the 1980s, U.S. firms lost major technology markets to foreign competition. In response, many firms increased emphasis on technology development for near term payoff while decreasing long term research for new technology.

The purpose of the Office of Energy Research of the U.S. Department of Energy (DOE) is to provide basic research and technology development that triggers and drives economic development and helps maintain U.S. world leadership in science. We do so through programs of basic and applied research that support the Department's energy, environmental and national defense missions and that provide the foundation for technical advancement. We do so by emphasizing research that maintains our world leadership in science, mathematics, and engineering and through partnerships with universities, National Laboratories, and industries across the Nation.

The Office of Energy Research investment in basic research (approximately $1.7 billion in fiscal year 1995) is the fourth largest among the fifteen Federal agencies that are the primary supporters of basic research. This level follows only the National Institutes of Health, the National Science Foundation, and the National Aeronautics and Space Administration. With the additional investment in equipment and construction of the major research facilities, our investment is second only to the National Institutes of Health. We manage over 90 percent of the nation's research in high energy physics and nearly 90 percent of the Nation's research in nuclear physics

The Program Offices of the Office of Energy Research

Basic Energy Science

Fusion Energy

High Energy and Nuclear Physics

Applied Mathematical Science

Biological and Environmental Research

and we conduct the largest Federal basic research program on materials. The office is a major contributor to the Nation's science and technology capability.

The programs of the Office of Energy Research span five focus areas, namely:

- Research and development that produces knowledge needed for technology to fulfill the Department's energy, environment, and industrial competitiveness missions. Programs in this area are Fusion Energy, Applied Mathematical Sciences, and Basic Energy Sciences, with its research in the materials, chemical, and applied mathematical sciences, engineering and geosciences, and energy biosciences. Similarly, research on environmental effects, health effects, general life sciences, the human genome, nuclear medical applications, global climate change and related analytical technology are in this area under our Biological and Environmental Research program.

OUR VISION FOR 2010

The Office of Energy Research ensures the Department's success and the Nation's economic, energy, and environmental welfare by being:

- the recognized leader in world-class research and energy science;
- a key contributor to U.S. leadership in developing clean, economical, and sustainable energy technologies, and environmentally conscious materials, technology, and industrial processes;
- the benchmark for domestic and international partnerships among academe, government, and industry;
- a recognized leader in operating research and development programs with a high commitment to scientific excellence, worker and public health and safety; and preserving environmental quality; and
- an effective steward of the Department's laboratory system.

- Fundamental research in energy and matter. This research advances knowledge for future technologies and helps maintain U.S. world leadership in science. High Energy and Nuclear Physics programs are in this category.

- Construction and operation of major experiments and user facilities. These facilities are advanced research tools needed for forefront research. They include accelerators for high energy and nuclear physics research, neutron sources, magnetic fusion facilities, and synchrotron light sources for physical and biological research. They also include topical facilities for research on combustion and environmental molecular sciences. Energy Research makes available thirty such facilities to scientists and engineers from industry, universities, DOE programs, and others. We are completing the construction of four new facilities that will begin operation in the next four years.

- Partnerships with the private sector in areas proposed by industry. Our partnerships both ease the application of scientific outputs from the program and further the Department's mission. This category includes our Technology Transfer program, Cooperative Research and Development Agreements, and other partnership arrangements with industry. It also includes partnerships with the Department's technology programs, and the Small Business Innovative Research Program, which we manage for the entire Department of Energy.

- High-quality and timely educational assistance and scientific and technical information services provided to a wide range of customers. These efforts, which are inherent to the research programs, include support for nationally competitive graduate and postdoctoral research fellowships, and teacher training through hands-on research at national laboratories.

Energy Research programs and facilities are largely at universities and National Laboratories. The Office has a special role in assuring the vitality and responsiveness of these institutions. Our interest and commitment to universities springs from their responsibilities for the next generation of scientists and engineers. These young people bring the best and the brightest minds to the Department's programs and make the creative enthusiasm of youth available to tackle national problems.

The National Laboratories, with their multidisciplinary scientific teams, carry out large-scale coordinated research on complex national problems. These problems include global climate change, advanced and environmentally conscious manufacturing, advanced materials and processing, medical applications, high performance computing and communications, mapping the human genome, high energy physics and nuclear physics. The National Laboratories make major contributions. Among them have been definition and early development of the entire field of nuclear medicine and the ground breaking applications of large scale, high speed computing and interactive computing. The Laboratories are invaluable resources for the future.

WE SUPPORT NATIONAL AND DEPARTMENTAL GOALS

On February 22, 1993, President Clinton and Vice President Gore published *Technology for America's Economic Growth, A New Direction to Build Economic Strength.* In this publication the Administration announced a policy of using federal research and development to accomplish three goals:

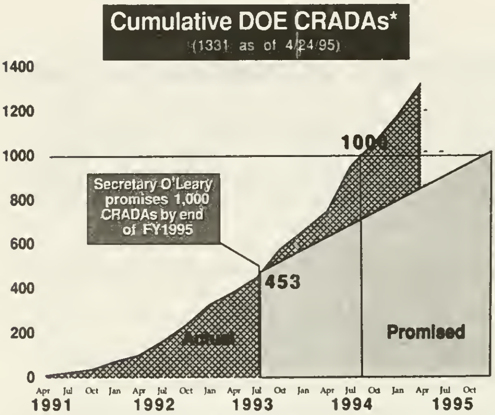
- Long-term economic growth that creates jobs and protects the environment
- A government that is more productive and more responsive to the needs of its citizens, and
- World leadership in basic science, mathematics, and engineering

The Department of Energy Strategic Plan, *Fueling a Competitive Economy,* challenges the Department's science and technology programs to help industry compete effectively in the near-term while meeting industry's need for long-term research. The plan calls on the science and technology programs to provide the fiscal accountability and environmental responsibility that the public expects. *Fueling a Competitive Economy* lays out the Department's five business lines and four critical success factors.

This Office of Energy Research Strategic Plan, in turn, supports the Department's Strategic Plan. It emphasizes scientific inquiry in support of major Departmental missions and of technology critical for economic prosperity. The plan stresses partnerships with other Departmental programs, universities, and industry to serve as catalysts for solving important problems. In the plan we anticipate increased involvement in the important problems of society through multidisciplinary research and development where our core competencies are strongest. Our plan also stresses international cooperation as an effective and efficient avenue for solving large and complex problems that one nation cannot efficiently solve alone.

Signing of the historic AMTEX partnership agreement that links National Laboratory capabilities to the needs of the textile industry for improved efficiency and competitiveness.

In this plan we honor our commitment to stewardship of fundamental research in energy and matter and to world leadership in basic



Cumulative DOE CRADAs*
(1331 as of 4/24/95)

** Cooperative Research and Development Agreement (CRADA)*

We have had great success with our CRADAs and have met our goal of 1000 CRADAs a full year early.

research. This means continued availability of the best and most advanced facilities and instrumentation for research. It also means fiscally and environmentally responsible construction, operation, and decommissioning of facilities.

During the past two years we signed over 200 Cooperative Research and Development Agreements (CRADAs) with industry. We participated in over 800 other collaborations across all sectors of the economy. There are notable examples, such as, the analysis of complex generic chemical structures. This work is underway at the Carbohydrates Center of the University of Georgia in support of over 135 corporations.

The Partnership in New Generation Vehicle Program is a cooperative program between industry and DOE's Office of Energy Research, Office of Energy Efficiency and Renewable Energy, and Office of Fossil Energy. One of its major activities is to develop new computer models for predicting emissions from advanced automotive designs. Another cooperative program, between the Office of Energy Research and the Office of Fossil Energy, promises new technologies for the domestic oil and gas industry.

OUR CUSTOMERS

Energy Research supplies scientific knowledge, tools and information. Delivered products include technical data, measurements, theories, computational capabilities, scientific instruments, diagnostic and design tools, and emerging technologies. These products are used by our customers in a variety of circumstances. Much of the research is broad, providing knowledge that benefits more than one customer, technology, sector, or application. Current research in combustion chemistry, for example serves many uses. Its products find use in technology development of home furnaces, industrial boilers, a new generation of vehicles, and the prevention of toxic wastes.

Our customers include more than 9,700 scientists and engineers who use our major user facilities and those who are recipients of approximately 1,800 university research grants. The government laboratories and contractors that we support are also our customers. Similarly, industries and small businesses that engage in cooperative research with our office or apply for financial assistance are our customers.

OUR CORE VALUES

The Office of Energy Research is a results-oriented organization that plans, funds and manages technically excellent and cost-effective research programs that support the Department's missions. We have a long-range perspective while seeking opportunities for near-term applications, and we share responsibility for maintaining the scientific and technical capability of the Nation. To achieve our vision, we recognize we must conduct ourselves according to the core values listed below and we seek evaluation of our performance on living these values.

- We value creativity and innovation
- We are customer-oriented
- We are committed to excellence and continuous improvement
- Our people are our most important resource
- We rely on individual scientists, technical teams, and facilities that make it possible to accomplish our mission
- We are team players and promote teamwork, at home and abroad
- We respect the environment and promote employee and public safety and health
- We are leaders, responsible for our actions
- We are effective stewards of the taxpayer's funds utilized for research and development programs
- We practice the highest standard of ethical behavior
- We communicate openly and effectively
- We foster employee and customer diversity

Our customers also include the Congress and its staff, the Office of Management and Budget, and other Federal research policy agencies such as the Office of Science and Technology Policy. Within the Department, our customers include the technology program offices such as Fossil Energy, Energy Efficiency and Renewable Energy, and Environmental Management. The DOE Operations Offices, the Chief Financial Officer, the Policy Office, and the Office of the Secretary are customers. Other Federal research and development agencies such as the Department of Defense and the National Science Foundation are also customers. These customers rely upon our programs for research facilities, information, plans, and effective management of part of the Nation's scientific and technological enterprise.

PROGRAM GOALS, STRATEGIES, AND SUCCESS INDICATORS

We have identified six goals that describe what the Office of Energy Research expects to accomplish in science and technology in the coming years. Four other goals describe what Energy Research expects to achieve in improving its business and management practices, including fully satisfying environment, safety and health responsibilities. Strategies under each goal tell how we plan to reach it. Success indicators show how Energy Research plans to measure its progress in accomplishing each goal.

Goal 1

Advance sustainable energy production and use, economic growth, and a healthy citizenry through research and technology transfer, leading to new and improved technologies.

"Applied research done in a basic atmosphere has a sophistication that is hard to duplicate in a less scientific atmosphere...

Basic research done in an applied atmosphere has a kind of no-nonsense aggressiveness that is hard to duplicate when other basic research is done entirely by itself."

-Alvin Weinberg, 1967

To achieve its mission of efficient energy use, a productive and competitive economy, and to improve environmental quality the Department must have results from research in basic energy sciences, environmental sciences, life sciences, and high performance computing and communication. Achievement of sustainable development will provide future generations with a continuing broad range of options to respond to energy, environmental, and development challenges.

Our biological science programs in mapping and sequencing the human genome, in structural biology and in medical applications continue to have enormous impacts in biomedical research, technology and industry. Examples are new radionuclides, radiopharmaceuticals, and instrumentation for imaging in molecular nuclear medicine, especially with positron-emission-tomography (PET). These advances lead to new tests and drugs for treating cancer, heart disease, and neurological diseases such as alcoholism and cocaine abuse. Boron neutron capture therapy is in clinical trials for treating brain and skin cancers.

A National Laboratory scientist prepares a filter for use with a DNA sequencing technique that could greatly speed up the identification of gene patterns. The human genome consists of as many as 100,000 genes. Mapping the entire genome's structure may help researchers find ways to prevent or cure birth defects and hereditary diseases.

Strategies that we will use to reach the goal:

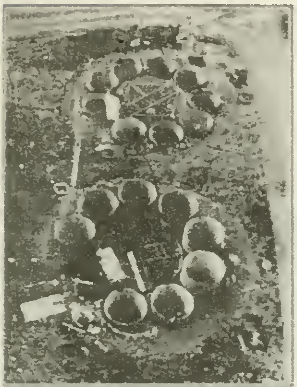
- Invest in peer reviewed and focused basic research programs.
- With industry partners, apply DOE strengths in biotechnology, medical applications, computational science, information technologies, chemical techniques, and materials synthesis and processing to solving national problems.
- Develop and apply molecular biology tools for finding and identifying health effects.
- Strengthen partnerships with semiconductor, gas and oil, metals, chemicals, ceramics, magnetics, computer and biotechnology industries.
- Raise the visibility of Energy Research's services and products.
- Pursue basic and applied research supporting Presidential and Departmental initiatives, e.g., Partnership for a New Generation Vehicle (PNGV).
- Actively involve customers in research program planning and evaluation.

The Loma Linda Proton Accelerator, the world's smallest proton synchrotron, is the first designed specifically for therapy and is revolutionizing certain forms of cancer treatment. The first patient was treated in October 1990 at the Loma Linda University Medical Center in California. The underlying principles for this accelerator were the direct outcome of accelerator technology developed to pursue basic high energy physics research.

Indicators of our success in meeting this goal are:

- Program-developed technologies adopted by DOE and other agencies, industry, and the public.
- DOE technology program and industrial customers participate in program planning.
- Customers give positive reactions, including showing increasing importance of our support to their business.
- Value added to the Nation as measured by economic studies.
- Highest quality of science produced (positive peer reviews, licenses, awards, and other).
- Industry and government customers choose Energy Research to supply science and technology in its areas of core competency.

Goal 2 *Understand and anticipate environmental effects of energy production and use, and develop advanced products, processes, and technologies to improve environmental quality.*



Lysimeters (left) are 10 ft deep concrete cylinders developed by Defense Programs for studying radioisotope leaching in landfills at the Oak Ridge National Laboratory. In a joint project between the University of Tennessee and ORNL, the Lysimeters will be filled with earth containing organic contaminants, and genetically-engineered bacteria will be introduced and studied for their bioremediation activity.

For the United States to enhance environmental quality, maintain economic growth, and stay competitive, energy usage and energy options must be sustainable over time and be environmentally sound. Our research and development competencies in chemistry, biology, physics, earth sciences, ecology, and the environmental and computational sciences enable us to address the intertwined energy and environmental challenges. Our programs seek to understand the interrelationships that exist within industrial processes, energy supply and use, and the environment. This is vital when the activities result in the production of products and by-products that could impair the Earth's environment.

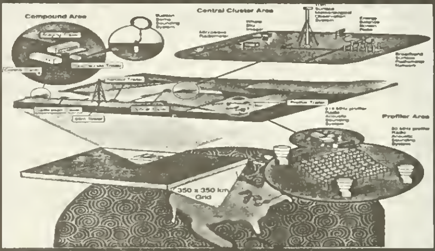
Strategies that we will use to reach the goal:

- Develop improved characterization techniques to ascertain and describe environmental issues.
- Research on safe and cost-effective environmental remediation and restoration methodologies and technologies.
- Focus on science-based prediction of environmental change.
- Champion science-based risk assessment.
- Carry out research addressing the potential for climate change, climate change mitigation, and consequent physical and biological adaptations.
- Continued merit review with peer evaluation of all research activities.

Indicators of our success in meeting this goal are:

- DOE and industry adopt techniques we identify or develop.
- Our products lead to reduced costs of acceptable environmental restoration technology.
- Improved and accepted methods for predicting environmental change become available.
- Industry and government adopt science-based risk assessment for establishing government regulations.
- Industry and government customers use methods developed in the program for mitigation and adaptation in environmental change.

The Southern Great Plains CART Site



Instruments at the Cloud and Radiation Test (CART) sight focus on the effects of solar and infrared radiation on Earth and its atmosphere. At the CART site, a variety of instruments will be used to study radiation in its component wavelengths. If scientists can understand the behavior of radiation in Earth's atmosphere, they can make progress on the question of whether human activity is altering climate

Goal 3 *Provide new insights into the nature of energy and matter to better understand our natural world.*

Fundamental science is a necessary foundation for applied programs that advance industrial competitiveness, maintain the Nation's science and technology capability, and provide improved approaches to our energy future. A major component of fundamental research is the study of the detailed structure of matter and energy.

Our fundamental research seeks to understand the structure and interactions of atomic nuclei and to understand the fundamental forces and particles of nature at the subnuclear level. Recent discoveries and technological advances improve our understanding of compelling scientific and intellectual issues. These issues include the origin of mass and why there is a preponderance of matter over antimatter in the universe. They also include the nature of the invisible matter that accounts for up to 90% of the mass of the universe.

Technicians perform maintenance on the central section of the 5,000-ton Collider Detector at Fermilab. Detectors such as this take snapshots of particle collisions in Fermilab's Tevatron accelerator in search of top quarks, and other unusual events.

Strategies that we will use to reach the goal:

- Pursue fundamental research in new scientific phenomena, especially in high energy and nuclear physics.

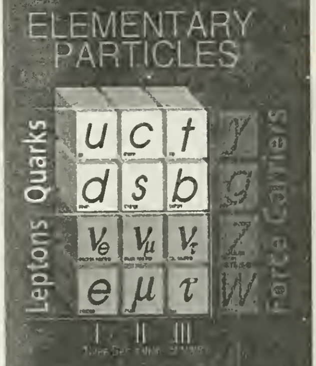
> *"Science reveals new worlds to explore, and by implication new opportunities to seize and new futures to create."*
>
> —Vice President Al Gore, Science in the National Interest, 1994

- Champion the recommendations of the High Energy Physics Advisory Panel's "Future Vision Subpanel" as the new direction for high energy physics.
- Prepare for and carry out research and development on the next accelerator beyond the Large Hadron Collider.
- Use the interagency Nuclear Science Advisory Committee to update the plan for nuclear physics.
- Enhance interagency, international and private sector involvement.
- Continue using peer review to assure quality research.

Indicators of our success in meeting this goal are:

- Highest quality of science produced (positive peer reviews, licenses, awards, and other).
- Understanding of subnuclear forces improves significantly.
- Important new phenomena discovered.
- Success in accomplishing the physics program outlined in the High Energy Physics Advisory Panel's "Future Vision Subpanel."
- Fulfillment of the long range plan for nuclear physics developed by the interagency Nuclear Science Advisory Committee.
- The United States sustains its scientific leadership in high energy and nuclear physics.
- Level of international cooperation leads to greater achievement of departmental and stakeholder research goals within budgets available.
- DOE and Federal strategy documents reflect the importance of fundamental science.

Standard Model of Elementary Particles



The search for the top quark has been under way ever since the bottom quark was discovered at Fermilab in 1977. In 1995, Top Quark was discovered by researchers at Fermilab -- providing strong evidence for the Standard Model, the prevailing theory of the particles and forces that determine the fundamental nature of matter and energy.

Goal 4 *Develop fusion as a cost-effective, publicly acceptable energy technology for sustainable development.*

Worldwide growth in population and living standards assures continued growth in the demand for electricity well into the future. Successful commercialization of fusion energy in the mid-21st Century will enhance the Nation's energy security and provide an environmentally acceptable alternative to fossil fuel combustion.

Fusion energy is potentially a virtually inexhaustible energy source. A pound of fusion fuel contains the energy equivalent of 12 million pounds of coal, 25 thousand barrels of oil, 142 million cubic feet of natural gas, or 4.5 pounds of fission fuel. Fusion will not release greenhouse gases associated with global warming nor chemicals associated with acid rain. It will not contribute to other forms of atmospheric pollution. These inherent attributes of fusion energy have led the Nation and the Department of Energy to consider fusion energy an important source of electricity generating capacity.

An engineer inspects the interior of the vacuum vessel at the heart of Princeton's Tokamak Fusion Test Reactor

Strategies that we will use to reach the goal:

- Develop fusion energy as an integral part of an international fusion program, while maintaining a strong domestic program.
- Study the physics of burning plasmas, develop blankets for collecting fusion energy, and test nonnuclear tokamak technologies in ITER.
- Develop improved concepts for future power plants
- Develop components required for production and use of fusion power (magnetic and inertial), including low activation materials.
- Use the National Ignition Facility for studying the physics of inertial fusion fuel targets.

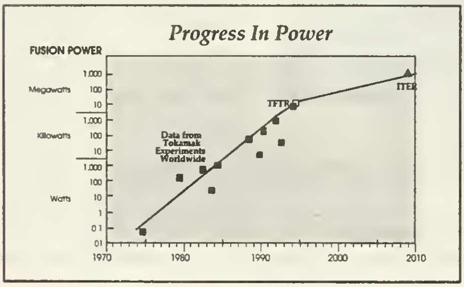
- Involve industry and the public early and often.

Indicators of our success in meeting this goal are:

- Sustained progress toward fusion conditions in plasma experiments.
- Demonstrate advanced concepts for use in a Demonstration Power Plant.
- The United States meets its commitments in the Engineering Design Activity of ITER.
- U.S. Industry participates substantially in any major project.
- Technology developed in the Fusion Program transfers successfully to industry.
- ITER's initial blanket operated and tested successfully.
- Establishment of a fusion neutron source and use of it for initial testing of low activation materials.
- Public awareness of fusion energy broadens.
- Targets for energy applications tested on the National Ignition Facility.

International Thermonuclear Experimental Reactor

The ITER project has become the focus of the four major world fusion programs, to demonstrate the scientific and technological feasibility of fusion energy. The U.S., the European Union, Japan, and the Russian Federation agreed to cooperate on an engineering and design effort, covering both design and R&D for the ITER tokamak.



Goal 5 *Sustain scientific leadership and improve U.S. competitiveness by providing world class scientific facilities and Department of Energy laboratories, with an adequate infrastructure.*

The Advanced Light Source

The Advanced Light Source (ALS) produces the world's brightest light in the ultraviolet and soft x-ray regions of the spectrum and provides unprecedented opportunities for research. A National User Facility located at Lawrence Berkeley Laboratory, the ALS is available to researchers from academe, industry and government laboratories.

The Department's research and development laboratories are highly valuable national resources with unequaled technical staff and assets. The laboratories conduct complex, multidisciplinary research that is not easily done in a university or industrial environment. An additional function of many laboratories is to provide large facilities for research. These advanced facilities provide an unparalleled experimental capability beyond what their own institutions can provide for scientists and engineers from industry, academia, the Department and other governmental laboratories. The host laboratory provides scientific expertise and infrastructure support to help users make the most effective use of the experimental apparatus. As large sites, the laboratories contain many supporting facilities such as steam plants, buildings, waste disposal systems, and roads which have to be maintained.

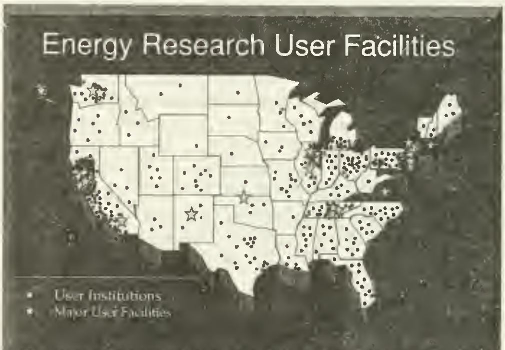
Strategies that we will use to reach the goal:

- Invest in technology development to advance capability and reduce cost of new scientific facilities.
- Review the need for existing scientific facilities based on their continuing contribution to research programs.
- Champion adequate funding for infrastructures at laboratories, for full use of facilities, and for innovation in the laboratories.
- Provide effective institutional planning and oversight (including environment, safety, and health; work for non-Department of Energy customers, and appraisals).
- Reduce laboratory costs by working with laboratory Management and all relevant DOE organizations.
- Consult industry, universities and other potential users in the planning, construction and operation of facilities.
- Conduct merit review with peer evaluation of research projects.

Indicators of our success in meeting this goal are:

- Highest quality of science produced (positive peer reviews, licenses, awards, and other).
- Increased use of facilities (number of users, hours of operation).

- Users express satisfaction with the performance of our facilities and the support they received.
- Facilities operate cost-effectively, including energy use, timely maintenance, and replacement of facilities when justified.
- Environment, safety, and health requirements are satisfied.
- Active facilities are reliable and available to support departmental programs and the scientific community; inactive and surplus facilities are disposed of responsibly.
- Construction and facility upgrading projects meet cost and schedule milestones and technical specifications.
- Scientific facilities' performance is at the forefront of science and matches or exceeds the best in other countries.
- International user participation improves productivity and reduces facilities' costs.
- Other agencies and industry increase their cooperation with and support of the program.
- The Congress commits to multiyear support of large construction projects.



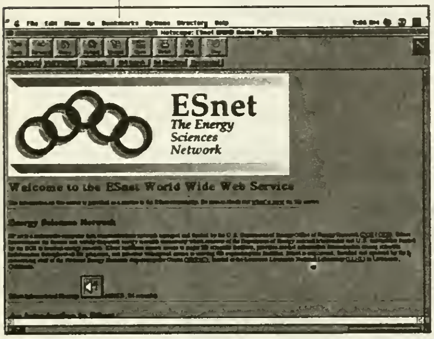
Energy Research User Facilities

The stars represent the dozens of "World Class" facilities provided to users from around the world. The black dots (more than 600 all together) indicate an institution or firm that utilizes one or more of the Energy Research facilities.

Goal 6

Advance the National Information Infrastructure by developing and demonstrating new information technologies for DOE applications.

Energy Research supports the development of communication, computational science and engineering capabilities enabling more efficient recovery, control, and use of energy supplies. Energy systems involve technical complexities that are difficult to portray in mathematical and engineering models. Modern science and engineering rely on such models and the information technologies that support them. This creates new concepts, technologies, and processes for energy and other practical applications.


ESnet
The Energy Sciences Network
Welcome to the ESnet World Wide Web Service

ESnet World Wide Web Home Page

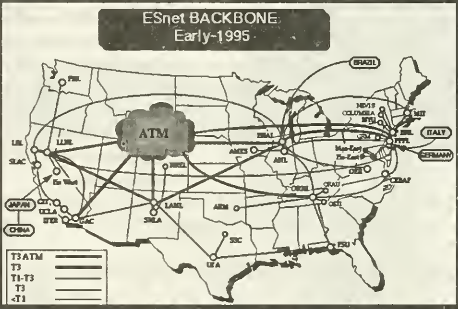
Strategies that we will use to reach the goal:

- Support peer-reviewed research and development in advanced computing, communications, and information technology and their application to challenges in energy science and in engineering.
- Participate as a leader in DOE and interagency activities for the National Information Infrastructure.
- Provide the technology for remote access to Energy Research facilities to achieve a "virtual laboratory" environment.
- Prototype energy demand and supply management as a National Information Infrastructure application.

Indicators of our success in meeting this goal are:

- Internal and external partners show increased satisfaction.
- Advanced Light Source and ITER on-line as "virtual laboratories."
- Utilities become increasingly involved in deployment of the National Information Infrastructure.

- "Federated databases" for computational biology developed and opened for use.
- Installation and successful operation of an electronic proposal process.
- Energy savings engendered by successful demonstration of prototypes of demand management information technologies.
- Highest quality of research performed.
- Energy Research makes increased use of National Information Infrastructure for meetings at a distance.
- Performers of Energy Research make high level use of the National Information Infrastructure.
- Private and public sector customers adopt technologies developed in the program.



All Americans have a stake in the construction of an advanced National Information Infrastructure (NII), a seamless web of communication networks, databases, and consumer electronics that will put vast amounts of information at users' fingertips. Development of the NII can help unleash an information revolution that will change forever the way people live, work, and interact with each other. The ESnet is becoming a core infrastructure component for research activities within DOE.

Goal 7

Ensure Energy Research's programs are managed to increase quality, more efficiently use human and material resources, and sustain protection of the environment and the health and safety of workers and the public.

Management, environment, safety, and health practices must be developed and implemented in a cost-effective, value-added manner to ensure high quality Energy Research programs and facilities. We must lead in developing and using innovative approaches to conduct our business, including powerful electronic management and communication tools that enhance the quality of our managers and programs.

Strategies that we will use to reach the goal:

- Maintain a proactive program of integrated environmental, safety, and health technical support.
- Establish effective teams with other departmental elements for key process improvements.
- Carry on an Energy Research Quality Initiative to become a departmental model for teamwork and Total Quality Management practices.
- Establish a quality staff development, recognition, and awards program.
- Strengthen a successful partnership with the union that represents workers in the Office of Energy Research.
- Ensure environment, safety and health operations are visible and documented.
- Align resources with strategies and priorities.

Bob Thompson and Andre Masaad conduct a construction safety inspection of the Advanced Photon Source project near Chicago.

Indicators of our success in meeting this goal are:

- Adaptation of best cost-effective management practices in the pursuit of excellence.
- Energy Research programs do not adversely effect the quality of the human environment appreciably.
- Establishment of individual development programs and incentives that work as intended.
- Improved management practices as measured by timeliness and effectiveness of our environment, safety and health actions.
- The Energy Research community is in the forefront of cost-effective protection of the environment and the health and safety of workers.
- Our customers use of innovations originating in the program to improve, streamline, and enhance their environment, safety and health and safety actions.
- Energy Research is active in a department-wide forum on environment, safety and health policy.

Goal 8 *Ensure that Energy Research activities, results and benefits are widely known, valued, and trusted.*

Our customers and stakeholders expect timely diffusion and distribution of the data, skills, and technology derived from the program. The public demands more accountability in government actions and spending and more results at lower costs. All members of the Energy Research family must serve the communication needs of their internal and external customers knowledgeably and responsibly.

Strategies that we will use to reach the goal:

- Develop and carry out an effective communications program for Energy Research programs.
- Foster customer and stakeholder participation in Energy Research's portfolio of research investments.
- Actively respond to internal and external review recommendations.
- Ensure public participation in key program decisions.
- Focus on customer satisfaction, i.e., survey customers and act on results.
- Increase our leadership and active participation in DOE and interagency activities.
- Promote a customer oriented policy for the Department's laboratories.

Liane Russell

Dr. Russell is a genetics researcher at Oak Ridge National Laboratory. She received the [illegible] Enrico Fermi Award "for her outstanding contributions to genetics and radiation biology, including her discovery of the role of X and Y chromosomes in sex determination in mammals and knowledge of the effects of radiation on the developing embryo and fetus. Her findings have been the benchmark for study of mutations in mammals and for assessing the risk to humans world-wide."

Indicators of our success in meeting this goal are:

- Annual surveys show an increase in customer and public satisfaction with Energy Research, including increased Administration and Congressional support.
- Increased Energy Research leadership of departmental and interagency groups and initiatives.
- Programs receive favorable peer reviews and expert advisory committee assessments.
- Departmental successes receive increased acknowledgment publications, citations, and awards.

Goal 9

Increase the effectiveness of U.S. investment in research programs and facilities through interagency and international cooperation and collaboration.

Due to economic growth and improved education, many countries are now doing research at the frontiers of science and technology. Domestic and international partnerships based on sharing the costs and benefits of research can reduce facility budgets, leverage R&D investments, tap greater intellectual resources, and increase effectiveness of our science programs. Global climate research is an example of such a major international activity. Fusion energy is also progressing as a joint international effort. There is extensive collaboration in high energy and nuclear physics. International collaboration is rapidly emerging in human genome research.

Strategies that we will use to reach the goal:

- Involve industry, universities and other potential users in planning and execution of facility construction and operation.
- Champion interagency and international involvement in planning, construction and use of very large projects.

Physicists come from all over the United States and the World to conduct collaborative and cooperative research at Fermilab. Their countries of origin are represented in the 20 foreign flags that fly daily in front of Wilson Hall.

- Champion international participation as an element in studies undertaken by panels and committees that advise Energy Research programs, e.g., the High Energy Physics Advisory Panel.
- Champion the continued use of scientific merit as the principle governing access to national and international science facilities.
- Consider international collaboration in developing program plans to leverage research and development investments.
- Champion establishment of an international forum for promoting intergovernmental collaboration in science projects.
- Participate vigorously as a significant partner in the ITER project.
- Pursue serious international collaboration in all phases of high energy and nuclear physics, and in studies of new neutron sources.

Indicators of our success in meeting this goal are:

- Significant strategic interagency and international consultations, partnerships and collaborations instituted to achieve departmental and stakeholder research goals.
- International interest in Energy Research projects increases.
- Level of international cooperation improved, while maintaining principle of merit-based access to large science facilities.
- An intergovernmental process to facilitate international collaboration on mega-science projects is carried out.
- The Department of Energy negotiates U.S. participation in the Large Hadron Collider project.
- A timely decision is made on the nature of U.S. participation in ITER construction.
- Japanese funded RHIC Spin Project integrated into the Relativistic Heavy Ion Collider's heavy ion program
- Energy Research does not wastefully compete with other research facilities, domestically or internationally.
- The Office of Energy Research is sought out by other U.S. Government agencies and other governments in the development of R&D collaborations.
- The Department of Energy rebuilds and reinforces its image as a reliable international partner.

Goal 10 *Strengthen the science and technical capability and promote the diversity of the Nation's work force.*

A Brookhaven biologist uses sign language to discuss a scientific experiment with a graduate of Gallaudet University, the world's only university for deaf and hard-of-hearing students. Washington, D.C.

Our future will be ever more technologically complex. The widespread use of electronic systems, continuing advances in medical technology, and the ever increasing presence of computers in the work place are some obvious examples. The role of new and changing technologies in our economy, in public policy discussions, and in our everyday environment demands a higher level of science education and technical competence in the Nation's work force and the public.

There is the potential to make greater contributions to the education of younger students, to diversify our scientific and technical work force, and to inform the public on scientific and technical issues. The Office of Energy Research has historically played an important role in the training of young scientists and engineers by supporting research grants to universities and students conducting research at Department laboratories.

Energy Research supports the Department's programs in training and education. This is especially true in energy science and technology, the environment and the impact of science on the economy. Beyond support of programs for university science education, Energy Research supports the DOE-wide program in science and mathematics for kindergarten through 12th grade.

Strategies that we will use to reach the goal:

- Maintain adequate investments in university research programs.

- Use the capabilities of the National laboratories for mathematics and science education
- In partnership with DOE education programs, promote involvement of Energy Research program participants in science and mathematics education.
- Give special emphasis to traditionally under represented research staff, students, institutions, and small and disadvantaged businesses.

Indicators of our success in meeting this goal are:

- Increased number, preparedness, and diversity of scientific and technical persons entering the Nation's work force.
- Greater participation by under represented groups in science and engineering in Energy Research supported research and facilities and as Energy Research program staff.
- Improved proficiency and number of students and postdoctoral fellows receiving support at laboratory user facilities and with Energy Research grants.
- Effectiveness of teachers and faculty members trained in Energy Research programs and laboratories in improving science and mathematics curricula for K-12 and undergraduate students.
- Program activities to increase and improve the understanding of mathematics and science by students and the public.

[illegible]

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The Secretary of Energy
Washington, DC 20585

March 4, 1996

MEMORANDUM FOR ALL DEPARTMENTAL ELEMENTS

FROM: HAZEL R. O'LEARY

SUBJECT: Department of Energy Strategic Management System

The purpose of this memorandum is to implement one of our most important management initiatives. DOE's Quality Transformation Goal 6 states: *The Department has a system which aligns strategic and operational planning with strategic intent, ensures this planning drives resource allocation, provides for regular evaluation of results, and provides feedback.* On December 13, 1995, I accepted the recommendations of a quality process improvement team for just such a system -- the Department of Energy Strategic Management System.

A detailed description of the Strategic Management System is provided as an attachment. While the description defines the activities for the fiscal year (FY) 1998 cycle, it is intended that the activities would be repeated for the FY 1999 cycle, and beyond, thus institutionalizing the process. As each cycle proceeds, lessons-learned would lead to improvements in the next cycle.

Implementation of the Strategic Management System is effective immediately. The system's key activities that will take place during the next twelve months are shown below:

KEY ACTIVITY	*COMPLETION DATE*
Secretary's FY 1996 Agreement with the President	Mar 15, 1996
FY 1997 Budget Highlights with Policy Overview	Mar 18, 1996
Secretary's 5-Year Budget and FTE Guidance for FY 1998	Apr 2, 1996
DOE FY 1994/1995 Annual Performance Report	May 1, 1996
Secretarial Officers First Draft Congressional Budget to CFO	Jun 3, 1996
FY 1998 Corporate Budget Review Meetings with Secretary	Jun 17 to Jul 15, 1996
DOE FY 1998 Budget Submission to OMB	Sept 3, 1996
DOE FY 1998 Annual Performance Plan to OMB	Sept 3, 1996
Secretary's FY 1997 Agreement with the President	Dec 31, 1996
Secretary's Quarterly Performance Reviews	Ongoing

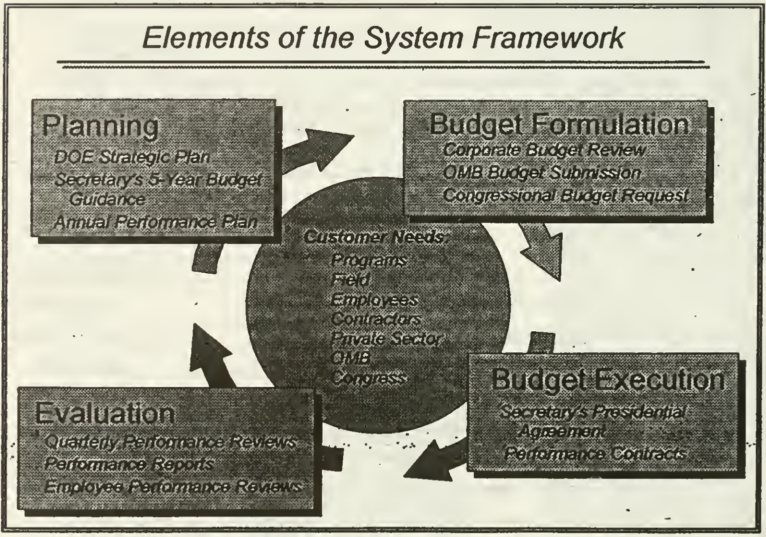
U.S. Department of Energy
Strategic Management System

System Framework

The Department of Energy's Strategic Management System clarifies, details, and documents interrelated strategic planning, budgeting, and program evaluation processes. By adopting a clearly defined, integrated, and systematic approach for its management activities, the Department will improve its overall performance through gains in effectiveness, efficiency, and quality.

Internally, the Department's commitment to performance-based management and its Strategic Alignment Initiative have driven the development of the Strategic Management System. External drivers include the Government Performance and Results Act of 1993, the Government Management Reform Act of 1994, Office of Management and Budget (OMB) directives, Executive Orders on customer service and performance management, and the National Performance Review.

The system is designed to satisfy customer requirements through the key processes and products shown below.



Elements of the System Framework

The Assistant Secretary for Policy will have overall responsibility for the Strategic Management System initiative. The Chief Financial Officer will continue to be responsible for budget activities. Secretarial Officers, Field Office Managers, and Contractor responsibilities are detailed in the attachment.

By working together during the past three years, our strategic planning, strategic alignment, contract reform, quality, and performance management initiatives have led to significant improvements in how we manage the Department's business and better serve our customers at lower cost. Through our initiatives, we have positioned ourselves ahead of the schedule mandated by governmentwide management initiatives such as the Government Performance and Results Act of 1993.

I am proud of our accomplishments. The development of the Strategic Management System provides a framework that ties our business practices together; it is now up to all of us to take advantage of the discipline it offers so we may realize the gains in effectiveness, efficiency, and quality that are available.

Attachment

The framework covers a complete cycle of activities for any fiscal year (FY), i.e., from the initial planning phase to the annual performance report following budget execution. For FY 1998, planning begins in late 1995 and a performance report will be completed in early 1999. During these 42 months, parts of the cycles for FYs 1995, 1996, 1997, 1999, and 2000 will also be taking place. At any given time, the Department conducts planning, budgeting, executing, or evaluating activities for four fiscal years.

The key processes—strategic planning, budget formulation, budget execution, and program evaluation—are interdependent and designed for effective program implementation and delivery of the Department of Energy's services to the Nation. Strategic planning determines the direction the Department will take toward achieving stated goals. Budget formulation defines priorities for spending resources and utilizing staff. Budget execution delivers goods and services to the Department's customers. Program evaluation assesses how well the Department has implemented its programs and is progressing toward achieving its goals. Each of these steps is informed by and dependent on the others.

Key Management Decision Points

In each fiscal year cycle, there are key management decision points that require the Secretary's personal involvement. The success of the Strategic Management System is dependent upon timely decision-making because information must flow from one process activity to the next. The key decision points for the FY 1998 cycle are shown below.

Strategic Management System Key Decision Points for FY 1998 Cycle

Key Decision Point	Schedule
Secretary's 5-Year Budget Guidance	April 1996
Budget Reconciliation	July 1996
Annual Performance Plan (Final)	October 1997
Secretary's Presidential Agreement	November 1997
Secretary's Performance Reviews	October 1997, February 1998, July 1998
DOE Annual Performance Report	March 1999

System Components

Appendix 1 shows a calendar for FY 1998 cycle activities. Appendix 2 shows the information flow among these activities and where data from other fiscal years will be used. A description of the products and activities for the FY 1998 cycle follows.

Planning

Planning is conducted at five organizational levels: DOE Corporate, Business Line and Critical Success Factor, Secretarial Officer, Field Office, and Contractor. In addition, planning addresses three time frames; namely, strategic (5 to 20 years), multi-year (5 years), and annual (1 year). While *planning* is essential at these organizational levels and time frames, the Strategic Management System requires only a minimal number of *plans* be published. Wherever possible, plans should be consolidated and redundancies eliminated. Only those plans that are required by laws or directives or that contribute to effective management should be published. The Strategic Management System is intended to ensure that plans add value and are consistent with other planning documents. Plans should clearly identify their purpose and their relationship to the Strategic Management System.

Department of Energy Strategic Plan. The Government Performance and Results Act requires that each Federal agency submit a strategic plan to OMB and Congress by September 30, 1997. In January 1997, the Department will begin the process of updating its existing strategic plan to meet this schedule. The updated plan will consolidate strategic planning for the Department, eliminating the need for other strategic plans at the same level, such as international, diversity, quality, and natural gas plans. The Assistant Secretary for Policy is responsible for coordinating the preparation of the updated Departmental Strategic Plan.

The Departmental Strategic Plan documents the ongoing definition and integration of DOE business activities. It articulates goals and strategies that will shape future budgets and guide program execution. The plan also presents success indicators and metrics to be used for performance measurement and program evaluation. Inputs to the Strategic Plan will include strategic planning by the Business Line and Critical Success Factor clusters, Field and Secretarial Officer strategic planning, Administration policies, the National Energy Policy Plan, findings of the Yergin and Galvin Task Forces, crosscut program plans, and other relevant information.

The Departmental Strategic Plan is reflected throughout Headquarters and Field organizations as missions, goals, and activities at every level are aligned with national energy and national security policies. The DOE Strategic Plan will be updated every three years, or sooner if significant changes in policies or planning assumptions occur. Minor changes will be accommodated in DOE's Annual Performance Plan.

Business Line and Critical Success Factor Strategic Planning. Champions for the Department's Business Lines and Critical Success Factors review their strategic plans to ensure their five-year performance planning and budgeting for the FY 1998 cycle reflects the latest strategic thinking.

Five-Year Performance and Performance Measures Planning. Five-year planning bridges the gap between long-range strategic planning and annual operational planning that is based on budget appropriations. The information needed to support five-year planning decisions includes five-year dollar and staffing projections and associated performance objectives and measures. This information is essential to determining annual budget and staff allocations, especially in a constrained fiscal environment. The results of five-year planning are passed up from the Contractor and Field levels to the Secretarial Officer and Business Line/Critical Success Factor levels. As this five-year planning rolls up, it will contribute from October through April to Departmental budget decisions and to development of Departmental crosscut and special-purpose five-year plans. The five years for planning are the fiscal year under consideration and the next four fiscal years. Details will be less available for the later years.

DOE Crosscut and Special Purpose Five-Year Plans. DOE develops some plans that are specifically required by laws or directives (e.g., national security, environmental management, and pollution prevention). Others are provided special status by senior management. In either case, crosscut and special-purpose plans should integrate the results of Secretarial Officer and Business Line strategic and five-year planning. In most cases, these plans should be available when the President's Budget is submitted to Congress in early February.

Secretary's Five-Year Budget and FTE Guidance. By April 2, 1996, the Secretary will provide to Secretarial Officers and Field Offices, guidance on budget and staffing levels for fiscal years 1998 to 2002. Secretarial Officers and Field Offices will use the guidance to formulate FY 1998 budgets and staffing plans, including the out-year projections.

The Secretary's Five-Year Budget and FTE Guidance will be prepared by the Office of Policy from December 1995 to March 1996 on the basis of analyses conducted by Policy, the Office of the Chief Financial Officer, the Office of Human Resources and Administration, and the Office of Field Management with input from the Business Line and Critical Success Factor clusters and any additional cross-cutting programs. The analyses will reflect reviews of the DOE Strategic Plan, Strategic Alignment goals and implementation plans, FY 1997 OMB five-year projections, FY 1996 appropriations, FYs 1995 and 1996 program performance, and program evaluations. As staff conducting the analyses will work closely with program staff, the guidance should contain no surprises.

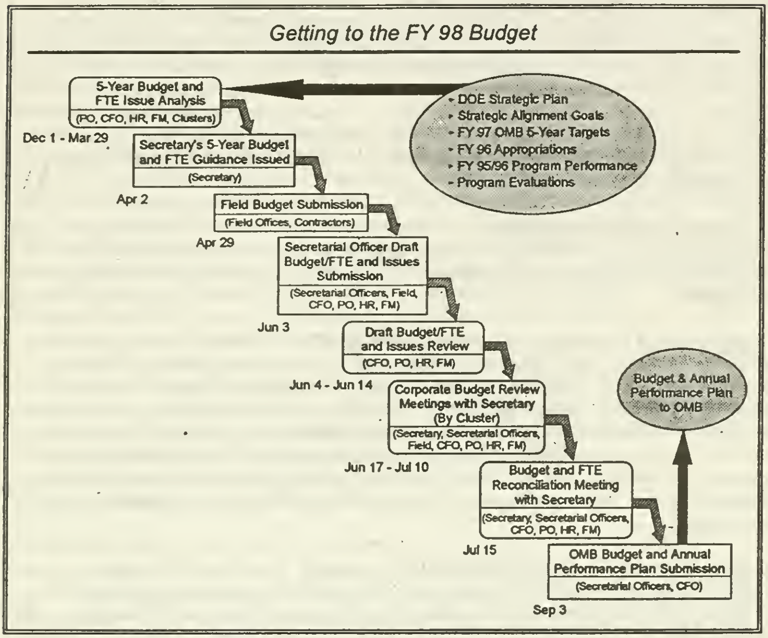
Annual Performance Plan. The Government Performance and Results Act of 1993 requires federal agencies to submit annual performance plans starting with the submission of the FY 1999 budget. The Department, however, will submit its first Annual Performance Plan to OMB with its FY 1998 budget request in early September 1996.

The Annual Performance Plan states the results the Department expects to deliver for the budget resources requested. It must be closely linked to the goals contained in the Department's Strategic Plan. The Annual Performance Plan accompanies the budget request through the OMB and Congressional reviews. Once Congress appropriates funds, the plan is adjusted to reflect any necessary changes. Preparation of the plan will be the responsibility of the Policy Office and the Office of the Chief Financial Officer. The content will be based on performance objectives and commitments provided by Secretarial Officers as part of their budget preparation.

Annual Operating Plans and Guidance. Once fiscal year funds are appropriated Secretarial Officers transmit operating guidance to the Field. Field Offices develop annual performance plans, M&O operating plans, and integrated site baselines to execute FY 1998 activities following this guidance. These guidelines inform contractors who develop implementing plans and schedules accordingly.

Budget Formulation

The key steps in the budget formulation process for FY 1998 are shown below. The process is designed to provide budget guidance as early as possible, to make major issues and concerns highly visible, to enable the Department's top management to make decisions in an efficient and timely manner, and to deliver a performance-based budget to OMB on schedule.


Getting to the FY 98 Budget
5-Year Budget and FTE Issue Analysis
(PO, CFO, HR, FM, Clusters)
Dec 1 - Mar 29
• DOE Strategic Plan
• Strategic Alignment Goals
• FY 97 OMB 5-Year Targets
• FY 96 Appropriations
• FY 95/96 Program Performance
• Program Evaluations
Secretary's 5-Year Budget and FTE Guidance Issued
(Secretary)
Apr 2
Field Budget Submission
(Field Offices, Contractors)
Apr 29
Secretarial Officer Draft Budget/FTE and Issues Submission
(Secretarial Officers, Field, CFO, PO, HR, FM)
Jun 3
Draft Budget/FTE and Issues Review
(CFO, PO, HR, FM)
Jun 4 - Jun 14
Corporate Budget Review Meetings with Secretary (By Cluster)
(Secretary, Secretarial Officers, Field, CFO, PO, HR, FM)
Jun 17 - Jul 10
Budget & Annual Performance Plan to OMB
Budget and FTE Reconciliation Meeting with Secretary
(Secretary, Secretarial Officers, CFO, PO, HR, FM)
Jul 15
OMB Budget and Annual Performance Plan Submission
(Secretarial Officers, CFO)
Sep 3

Five-Year Budget and FTE Issue Analysis. The Office of Policy, the Office of the Chief Financial Officer, the Office of Human Resources and Administration, and the Office of Field Management conduct issue analyses from December to February, as described above under planning.

Secretary's Five-Year Budget and FTE Guidance. The Office of Policy, in close cooperation with the Office of the Chief Financial Officer, the Office of Human Resources and Administration, and the Office of Field Management, prepares the Secretary's Five-Year Budget and FTE Guidance from December to March, as described above under planning.

Field Budget Submission. From mid-January to April 29, 1996, Field Offices prepare and submit budget proposals based on the Chief Financial Officer's Field Budget Call, the Secretary's Five-Year Budget and FTE Guidance, and Secretarial Officer program guidance. The Office of the Chief Financial Officer is responsible for coordinating this effort.

Secretarial Officer Budget and FTE Formulation. From early March to early June 1996, Secretarial Officers conduct budget and staffing-level impact analyses and prepare their first draft of their FY 1998 Congressional budget. This budget is due to the Chief Financial Officer on June 3, 1996. Preparation of program budgets (including Department cross-cutting programs) and staffing levels that conform to the Secretary's Five-Year Budget and FTE Guidance may bring out issues and options to be decided at the Corporate Budget Review meetings with the Secretary. Policy, Chief Financial Officer, Human Resources and Administration, and Field Management staff attend Secretarial Officers' budget formulation meetings, working closely with programs to analyze issues and develop options for consideration by the Secretary. Issues should be resolved at the appropriate organizational level. The Policy Office and Office of the Chief Financial Officer coordinate this process.

Draft Budget/FTE and Issues Review. From June 3 to June 14, 1996, Chief Financial Officer, Policy, Human Resources and Administration, and Field Management staff review the Secretarial Officer draft budget submissions in preparation for the Corporate Budget Review Meetings with the Secretary.

Corporate Budget Review Meetings with the Secretary. From mid-June to mid-July, Secretarial Officers, Field Offices, the Policy Office, the Office of the Chief Financial Officer, the Office of Human Resources and Administration, and the Office of Field Management present issues and options by Business Line, Critical Success Factor, and any additional cross-cutting programs to the Secretary in a series of separate meetings. At follow-up meetings within this time period, these same groups return to present answers to questions posed by the Secretary in the initial meetings. In response to these meetings, the Secretary provides guidance and decisions on major issues and priorities. The Policy Office and Office of the Chief Financial Officer will coordinate these meetings.

Budget and FTE Reconciliation Meeting with the Secretary. In mid-July, following the series of meetings described above, the Secretary meets with all Secretarial Officers together to reconcile any remaining differences in final budget and FTE targets for FY 1998. The Policy Office and Office of the Chief Financial Officer coordinates this meeting.

OMB Budget Preparation. From mid-July to the end of August, Secretarial Officers prepare final FY 1998 budget requests for Chief Financial Officer review and submission to OMB in the first week of September. During this same time, the Policy Office and the Office of the Chief Financial Officer will be working with the Secretarial Officers to prepare the FY 1998 Annual Performance Plan, which will accompany the budget through the OMB and Congressional budget processes.

Budget Highlights with Policy Overview. The Budget Highlights document is prepared each fiscal year by the Office of the Chief Financial Officer and the Policy Office to accompany DOE's budget request to Congress in early February. The Policy Overview section describes policies, priorities, and previous year accomplishments for DOE's proposed budget. The Budget Highlights section summarizes the program activities for each of the Department's Business Lines. The document consists of information derived from the DOE Strategic Plan and the Secretarial Officers' budget submissions.

Budget Execution

Through budget execution, the Department uses appropriated funds to deliver goods and services to its customers. The work is predominantly performed by DOE contractors through the Field organizations. It is therefore critical that the performance commitments made in the Department's planning and budget formulation processes be clearly communicated, understood, and agreed to by the Field Offices and contractors.

Secretary's Performance Agreement with the President. The National Performance Review, headed by Vice-President Gore, calls for the signing of a performance agreement between the head of each federal agency and the President. DOE's Secretary's Performance Agreement with the President for FY 1998 will establish the core set of commitments, organized by Business Lines and Critical Success Factors, to be measured and tracked for the Department's FY 1998 appropriations. The Agreement will be prepared by the Policy Office on the basis of information provided by Secretarial Officers and Field Offices. It will be ready for the President's signature in December 1997. The Agreement will be consistent with the Department's Strategic Plan, Annual Performance Plan, and Congressional appropriations.

Performance Contracts. The Department's Contract Reform Initiative has led to performance-based contracts which define what work will be done, how it will be accomplished, and how it will be evaluated for the purpose of compensation to contractors. These contracts are a critical force in turning the Department's plans and commitments into action and results.

Program Evaluation

Program evaluation, as defined in this document, includes performance measurement and tracking, analysis, and reporting. Performance measurement and tracking is an ongoing activity that informs management's current fiscal year decisions as well as future plans and budgets. The information derived from performance measurement plays an important analytic role in evaluating programs. In addition, a program's history and external factors will influence the determination of whether a program is judged a success, whether it is still relevant and effective, and whether it should be continued in its current form. Program evaluation also includes systematic analyses to determine the value or worthiness of new programs that are being considered for funding. Performance reporting is the documentation and sharing of the performance measurement and analyses information with customers and stakeholders to inform decision-making and to improve performance.

Performance measurement expands the concept of "success" from the mere accomplishment of activities to that of delivering desired outcomes and results to customers. Performance measures provide the actual linkage between the processes of planning, budgeting, executing, and evaluating. In planning, performance objectives are defined in terms of measurable results. In budget formulation and execution, resources are allocated and expended to deliver measurable products and services. In evaluation, success is based upon the measurement and analysis of actual performance. This concept of performance management must be cascaded through all of the Department's organizational levels, i.e., DOE Corporate, Business Lines and Critical Success Factors, Secretarial Officers, Field Offices, and Contractors. Ultimately, performance measurement provides a path of accountability between the Department's long-term vision and the day-to-day activities of individual federal and contractor employees.

Field Contract Evaluation Plans. Evaluation Plans define the bases for evaluating contractor's performance for the current fiscal year. Performance objectives should be consistent with the commitments made in the Department's Annual Performance Plan and the Secretary's Presidential Agreement. For FY 1998, Evaluation Plans should be in place by November 1997.

Field Performance Reviews and Contractor Performance Measure Reports. Contractors and Field Offices review performance on a regular basis (usually monthly) as determined by their individual management needs. The purpose of these reviews is to monitor progress on achievement of objectives and commitments and to improve performance.

DOE Performance Reviews. During the months of October, February, and July, the Secretary holds performance reviews to assess progress on the commitments made in the current fiscal year's Performance Agreement with the President. A separate review is held for each Business Line; the four Critical Success Factors are reviewed in one combined session. Each review lasts approximately two hours and is attended by the Secretary and the Secretarial Officers. The October review closes out the accomplishments of the previous fiscal year and finalizes the commitments for the current fiscal year. The February review covers the current fiscal year's first quarter performance and the July review covers performance through the third quarter. The Policy Office coordinates these reviews.

Contractor Award Fee Self-Appraisals. Contractor award fee self-appraisals provide input to the award fees contractors receive for successfully achieving the performance goals and objectives stated in their Contract Evaluation Plans. The self-appraisals establish accountability and reward performance.

DOE Annual Performance Report. The Government Performance and Results Act of 1993 and the Government Management Reform Act of 1994 require each agency to submit an annual performance report to Congress each March for the previous fiscal year. The Department intends to satisfy all these requirements with one report that documents the Department's actual performance against the objectives of the Annual Performance Plan and the commitments in the Secretary's Performance Agreement with the President. The Office of Policy coordinates the preparation of this report.

Employee Performance Reviews. Both federal and contractor employee performance is reviewed in accordance with applicable rules, personnel policies, and union agreements. Performance should be measurable, accountable, and traceable to performance plans, objectives, and commitments. Typically, reviews are based on a calendar year with a mid-year review in July and final review of the previous year's performance held in January.

Core Activities, Schedules, and Lead Roles

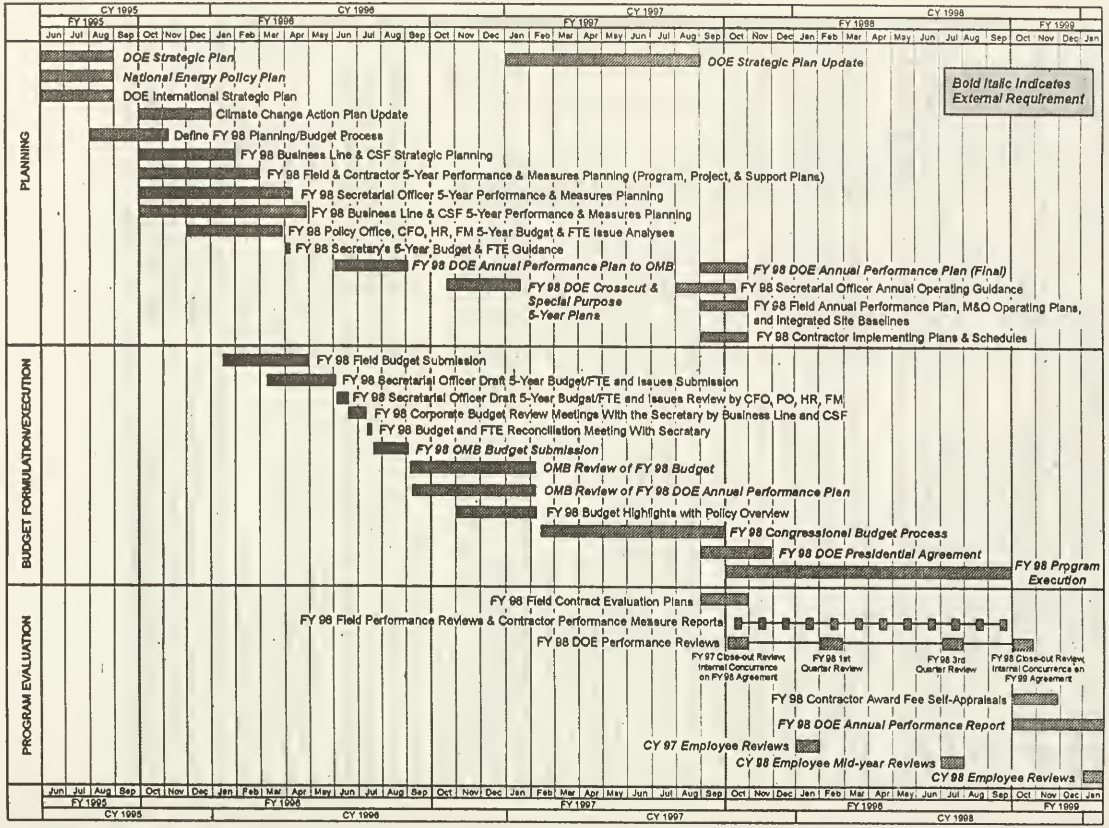
The following table lists in chronological order the core activities and products, schedules, and responsible individuals and offices for the full FY 1998 cycle.

FY 1998 Core Activities and Products	Schedule	Lead Role*
Business Line and Critical Success Factor Strategic Planning	Oct 1, 95 - Jan 31, 96	BL & CSF Champions
Field & Contractor 5-Year Performance & Measures Planning	Oct 1, 95 - Mar 1, 96	Field Offices, Contractors
Secretarial Officer 5-Year Performance & Measures Planning	Oct 1, 95 - Apr 15, 96	SOs
Business Line & Critical Success Factor 5-Year Planning	Oct 1, 95 - May 1, 96	BL & CSF Champions
PO/CFO/HR/FM 5-Year Budget and FTE Issue Analyses	Dec 1, 95 - Mar 29, 96	PO, CFO, HR, FM, BL & CSF Champions
Secretary's 5-Year Budget and FTE Guidance	Apr 2, 96	Secretary
Field Budget Submission	Jan 15, 96 - Apr 29, 96	Field Offices, Contractors
Secretarial Officer 5-Year Draft Budget, FTE, & Issue Submission	Apr 3, 96 - Jun 3, 96	SOs, Field, PO, CFO, HR, FM
Secretarial Officer 5-Year Draft Budget, FTE, & Issue Review by CFO, PO, HR, FM	Jun 4, 96 - Jun 14, 96	CFO, PO, HR, FM
Corporate Budget Review Meetings with the Secretary by Business Line and Critical Success Factors	Jun 17, 96 - Jul 10, 96	Principals, SOs, Field Offices, CFO, PO, HR, FM
Budget and FTE Reconciliation Meeting with the Secretary	Jul 15, 96	Principals, SOs, CFO, PO, HR, FM
Final OMB Budget Preparation and Submission	Jul 16, 96 - Sep 3, 96	SOs, CFO
DOE Annual Performance Plan Preparation and Submission to OMB	Jun 3, 96 - Sep 3, 96	PO, CFO
OMB Review of Budget and Annual Performance Plan	Sep 4, 96 - Jan 31, 97	OMB
DOE Crosscut and Special Purpose 5-Year Plans	Oct 15, 96 - Jan 15, 97	SOs
Budget Highlights with Policy Overview	Nov 1, 96 - Jan 31, 97	CFO, PO
President's Budget Submission	Feb 3, 97	CFO
Support Congressional Budget Hearings	Feb 3, 97 - Apr 97	Principals, SOs
Secretary's Performance Agreement with the President	Sep 2, 97 - Dec 31, 97	PO, SOs
DOE Annual Performance Plan (Final)	Sep 2, 97 - Oct 31, 97	PO, CFO
Secretarial Officer Annual Operating Guidance	Aug 1, 97 - Oct 15, 97	SOs
Field Annual Performance Plan, M&O Operating Plans, and Integrated Site Baselines	Sep 2, 97 - Oct 31, 97	Field Offices, Contractors
Contractor Implementing Plans and Schedules	Sep 2, 97 - Oct 31, 97	Contractors
Field Contract Evaluation Plans	Sep 2, 97 - Oct 31, 97	Field Offices, Contractors
Budget Execution	Oct 1, 97 - Sep 30, 98	SO's, Field, Contractors
Field Performance Reviews and Contractor Performance Measure Reports	Monthly, Oct 97 - Sep 98	Field Offices, Contractors
DOE Secretary's Performance Reviews	Oct 1997, Feb, Jul 98	Principals, SOs
Contractor Award Fee Self-Appraisals	Oct 1, 98 - Nov 30, 98	Contractors
DOE Annual Performance Report	Oct 1, 98 - Mar 1, 99	PO, SOs
Federal and Contractor Employee Reviews	Jan, Jul 98, Jan 99	SOs, Contractors

*Principals = Secretary, Deputy Secretary, and Under Secretary
BL & CSF = Business Line and Critical Success Factor
HR = DOE Office of Human Resources and Administration
CFO = DOE Office of the Chief Financial Officer
SOs = DOE Secretarial Officers
PO = DOE Office of Policy
FM = DOE Office of Field Management

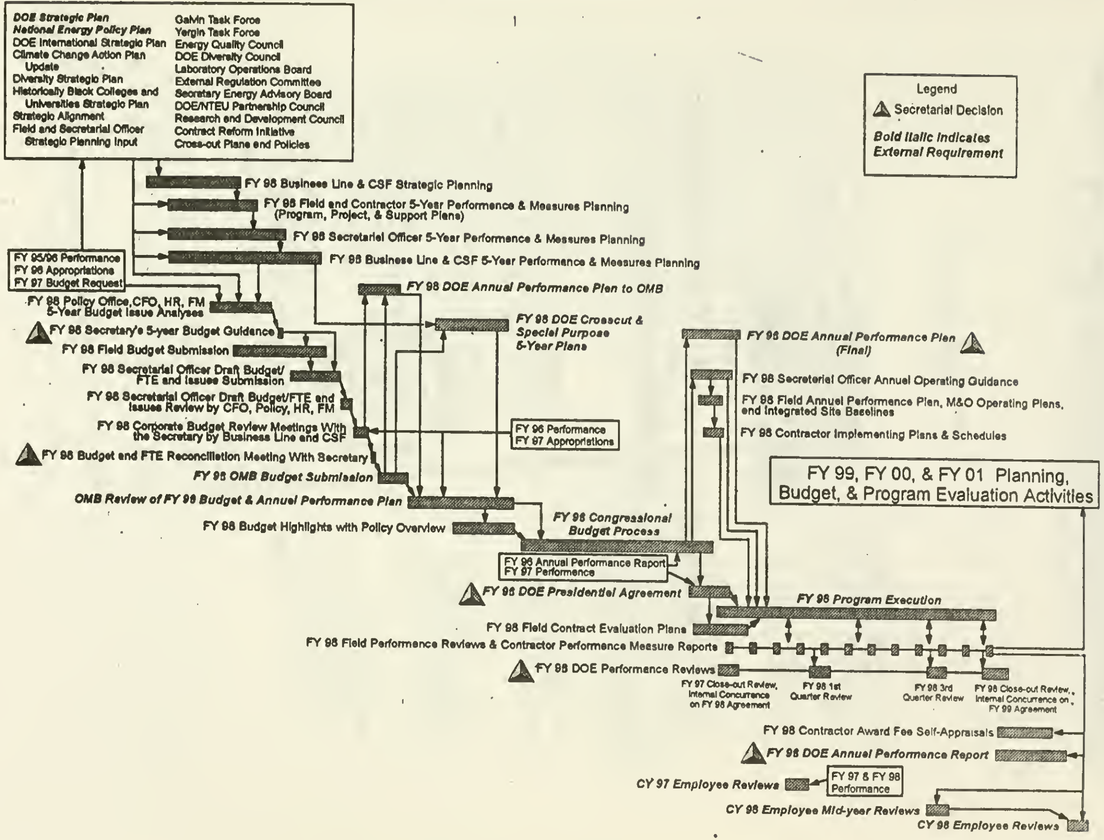
Appendix 1

DOE Strategic Management System Calendar for FY 1998



Appendix 2

DOE Strategic Management System Activities Information Flow for FY 1998 Cycle


DOE Strategic Plan
National Energy Policy Plan
DOE International Strategic Plan
Climate Change Action Plan Update
Diversity Strategic Plan
Historically Black Colleges and Universities Strategic Plan
Strategic Alignment
Field and Secretarial Officer Strategic Planning Input
Galvin Task Force
Yergin Task Force
Energy Quality Council
DOE Diversity Council
Laboratory Operations Board
External Regulation Committee
Secretary Energy Advisory Board
DOE/NTEU Partnership Council
Research and Development Council
Contract Reform Initiative
Cross-cut Plans and Policies
Legend
Secretarial Decision
Bold Italic Indicates External Requirement
FY 98 Business Line & CSF Strategic Planning
FY 98 Field and Contractor 5-Year Performance & Measures Planning (Program, Project, & Support Plans)
FY 98 Secretarial Officer 5-Year Performance & Measures Planning
FY 98 Business Line & CSF 5-Year Performance & Measures Planning
FY 95/96 Performance
FY 96 Appropriations
FY 97 Budget Request
FY 98 DOE Annual Performance Plan to OMB
FY 98 Policy Office, CFO, HR, FM 5-Year Budget Issue Analyses
FY 98 DOE Crosscut & Special Purpose 5-Year Plans
FY 98 Secretary's 5-year Budget Guidance
FY 98 Field Budget Submission
FY 98 DOE Annual Performance Plan (Final)
FY 98 Secretarial Officer Draft Budget/ FTE and Issues Submission
FY 98 Secretarial Officer Annual Operating Guidance
FY 98 Secretarial Officer Draft Budget/FTE and Issues Review by CFO, Policy, HR, FM
FY 98 Field Annual Performance Plan, M&O Operating Plans, and Integrated Site Baselines
FY 98 Corporate Budget Review Meetings With the Secretary by Business Line and CSF
FY 96 Performance
FY 97 Appropriations
FY 98 Contractor Implementing Plans & Schedules
FY 98 Budget and FTE Reconciliation Meeting With Secretary
FY 99, FY 00, & FY 01 Planning, Budget, & Program Evaluation Activities
FY 98 OMB Budget Submission
OMB Review of FY 98 Budget & Annual Performance Plan
FY 98 Congressional Budget Process
FY 98 Budget Highlights with Policy Overview
FY 96 Annual Performance Report
FY 97 Performance
FY 98 DOE Presidential Agreement
FY 98 Program Execution
FY 98 Field Contract Evaluation Plans
FY 98 Field Performance Reviews & Contractor Performance Measure Reports
FY 98 DOE Performance Reviews
FY 97 Close-out Review, Internal Concurrence on FY 98 Agreement
FY 98 1st Quarter Review
FY 98 3rd Quarter Review
FY 98 Close-out Review, Internal Concurrence on FY 99 Agreement
FY 98 Contractor Award Fee Self-Appraisals
FY 98 DOE Annual Performance Report
CY 97 Employee Reviews
FY 97 & FY 98 Performance
CY 98 Employee Mid-year Reviews
CY 98 Employee Reviews

PERFORMANCE AGREEMENT

BETWEEN

THE PRESIDENT OF THE UNITED STATES
WILLIAM JEFFERSON CLINTON

AND

DEPARTMENT OF ENERGY
UNITED STATES OF AMERICA

THE SECRETARY OF ENERGY
HAZEL R. O'LEARY

FISCAL YEAR 1996

SECRETARY'S PERFORMANCE AGREEMENT

THE DEPARTMENT OF ENERGY

OVERVIEW

The Department of Energy is working to advance the nation's priorities and the Administration's commitments in the areas of energy security, environmental quality, national security, and science and technology. For FY 1996, the Department's commitments advance the goals, priorities, and expectations of Secretary Hazel O'Leary and move us toward our vision of a more efficient and effective government. We have begun the difficult task of downsizing through office consolidations, business process reengineering, and elimination of nonessential activities. We are building on our past successes and improving our management as we move forward.

Building on our success

We have delivered on *all* of our FY 1995 commitments. In FY 1996 we will continue to build on our progress in strengthening nuclear nonproliferation, replacing underground testing with science, understanding and dealing with risks associated with environmental problems resulting from nuclear weapons production during the Cold War, and promoting clean and efficient supply of energy. We have additional commitments in the areas of global non-proliferation, advancement of science for environmental cleanup, and management practices at DOE's laboratories.

Improving our processes

With experience, we are improving the measures for these commitments. They are more specific, quantified, and meaningful for managers, employees, and the American taxpayers.

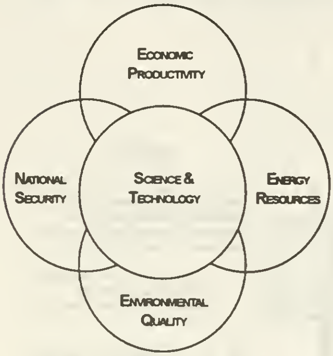
This Agreement is the commitment by the Department of Energy team to turn *resources into results.* We will continuously improve the Department of Energy as we create a *government that works better and costs less.*

OUR VISION

The Department of Energy through its leadership in science and technology will advance U.S. economic, energy, environmental, and national security by being:

- ***A major partner in world class science and technology, research centers and university research.***
- ***A vital contributor to reducing the global nuclear danger through its national security and nonproliferation activities.***
- ***A world leader in environmental restoration, waste management, and pollution prevention.***
- ***A key contributor in developing, applying, and exporting sustainable, clean and economically competitive energy technologies.***
- ***A key contributor in maintaining U.S. global competitiveness through leadership in environmentally-conscious materials, technologies, and industrial processes.***
- ***A safe and rewarding workplace that promotes excellence, nurtures creativity, rewards achievement, and is results-oriented and enjoyable.***

DOE's Goals



To realize our Vision, the Department has established the following **FIVE KEY GOALS:**

- ✓ ***Leverage DOE's Unique Science and Technology Capabilities to Provide Knowledge that Drives the Nation's Future***
- ✓ ***Reduce the Global Nuclear Danger***
- ✓ ***Restore, Stabilize, Protect, and Enhance the Environment***
- ✓ ***Develop and Promote Clean Efficient Energy Technologies and Enhance Energy Security***
- ✓ ***Stimulate U.S. Economic Productivity***

DOE's Critical Success Factors

To sustain all of our initiatives, the Department has adopted the principles of Total Quality Management to improve customer service and cut costs. Consistent with these principles, DOE will build its reinvention on **FOUR FACTORS** critical to realizing our Vision:

- ✓ ***Improve Communications and Trust***
- ✓ ***Increase Productivity of DOE's Human Resources for Our New Mission***
- ✓ ***Achieve Excellence in the Safety and Health of DOE Workers, the Public, and the Environment***
- ✓ ***Become the "Best In Class" in the Use of Management Practices***

Under each of our goals and critical success factors, the Department has established commitments that identify our most significant outcomes. Under each commitment, and consistent with our budget for FY 1996 we have established ***"measures of success"***. In this FY 96 Agreement, we have set forth a total of 67 commitments and 183 measures of success.

THE DEPARTMENT OF ENERGY'S GOALS

The Department of Energy has a rich heritage of meeting important national goals in the areas of science and technology, national security, environmental quality, energy resources and economic productivity. The following goals and commitments are our contract with the American taxpayers in FY 1996.

SCIENCE & TECHNOLOGY

Unleash the Department's deep reservoir of scientific and technological assets and capabilities—40,000 scientists and engineers, including Nobel Prize winners, and a $30 billion laboratory system—to perform world class basic and applied research in energy and national security arenas, that will advance U.S. security and economic productivity. DOE will continue to support a broad national science and technology port-folio, ranging from the supercomputing initiative with its oil and gas exploration applications, to advanced materials research, with its automotive applications.

OUR COMMITMENTS

ST-1 IMPROVING SERVICE DELIVERY AT DOE SCIENCE FACILITIES

Improve the efficiency of operations and quality of services provided to scientists at the Department's leading-edge basic research facilities. Ensure that facilities are available to users and operated in a reliable and predictable manner that ensures high-quality research products and technology innovations. **(ER)**

☐ *Success will be measured in FY 1996 by:*

- *Increasing the availability of DOE scientific facilities consistent with the Science Facilities Initiative to enable a wide array of research that will advance science and produce tomorrow's technologies by increasing the operating time at the:*
  - *Stanford Synchrotron Radiation Laboratory from 4,000 to 5,600 hours, a 40 percent increase,*
  - *Advanced Light Source from 3,000 to 4,200 hours, a 40 percent increase,*
  - *Intense Pulse Neutron Source from 2,000 to 4,000 hours, a 100 percent increase,*
  - *High Flux Beam Reactor from 3,600 to 4,700 hours, a 30 percent increase, and*

  increasing or upgrading user beamlines from 200 to 210 to improve user capabilities at the synchrotron light sources and neutron facilities.

ST-2 INITIATING SCIENCE-BASED PROGRAMS TO FIND NEW METHODS FOR ENVIRONMENTAL CLEANUP

Initiating science-based programs to find new cost-effective methods for environmental clean-up of DOE sites. **(ER)**

- ☐ *Success will be measured by:*
    - *Developing a 10-year program plan for bioremediation research and implementing the first phase by March 1996 for clean-up of national laboratory and nuclear weapons production sites.*
    - *Initiating a basic research program effort by September 1996 through an ER/EM partnership in order to provide less costly and more effective cleanup technologies.*

ST-3 TRANSFERRING ENVIRONMENTAL TECHNOLOGIES

Demonstrate new environmental technologies and systems and transfer them to private industry and Federal facilities. **(EM)**

- ☐ *Success will be measured by:*
    - *Demonstrating over 166 new environmental technologies and systems, to include the:*
        - *Radioactive Plasma Hearth Process,*
        - *Cesium Removal Demonstration at Oak Ridge, and*
        - *Spectral Gamma Probe for Cone Penetrometer.*
    - *Making 66 environmental technologies available for transfer and use by private industry and Federal facilities, to include the:*
        - *Light Duty Utility Arm at Hanford,*
        - *Portable Vitrification Unit at Oak Ridge,*
        - *Mobile Evaporator at Oak Ridge, and*
        - *LASAGNE™ in-situ process for waste treatment.*

ST-4 EXPLORING THE FRONTIER OF HIGH ENERGY PHYSICS

Pursue opportunities for the U.S. to participate in the Large Hadron Collider (LHC) project at the European Laboratory for Particle Physics (CERN) in Geneva, Switzerland to explore the frontier of experimental high energy physics and promote increased international scientific collaboration. **(ER)**

- ☐ *Success will be measured in 1996 by negotiating one or more LHC agreements with CERN, in partnership with the National Science Foundation to enable American scientists to explore the fundamental nature of energy and matter.*

ST-5 INVESTIGATING THE CAUSES OF GLOBAL CLIMATE CHANGE

Continue to provide strong support to the Interagency effort to investigate the natural and human causes of global climate change phenomena and reduce U.S. greenhouse gas emissions. **(ER)**

- ☐ *Success will be measured in FY 1996 by collecting and analyzing data on atmospheric conditions to enable better assessments, damage prediction, and mitigation for ecosystems by:*
    - *designing, building, and testing an Atmospheric Radiation and Cloud Station in the Western Pacific by September 1996 to collect critical cloud and radiation data,*
    - *completing atmospheric radiation measurements by June 1996 to verify enhanced absorption of solar radiation by clouds to improve the accuracy and predictive capability of global climate models,*
    - *completing preparations to measure the absorption of CO2 from the atmosphere by March 1996, and*
    - *implementing experiments that quantify effects of changes in weather and air pollution on forests by June 1996.*

ST-6 CONTINUING PEACEFUL USES OF THE ATOM

Continue cooperative efforts begun in 1973 for fundamental properties of matter, magnetic confinement fusion, nuclear reactor safety, environmental restoration and nuclear waste management under the Peaceful Uses of Atomic Energy Agreement (PUAE). **(PO)**

- ☐ *Success will be measured by:*
    - *Continuing cooperation with Russia under the PUAE, even if the agreement is not formally extended.*
    - *Working with the State Department, National Security Council, and the Office of the Vice President to:*
        - *develop an interagency strategy by December 1995 for renewal of the PUAE agreement,*
        - *extend the PUAE umbrella agreement for one year period beginning January 1996, and*
        - *extend the four cooperative agreements under the PUAE for their full terms.*

ST-7 ENSURING THE AVAILABILITY OF ISOTOPES FOR INDUSTRY, RESEARCH AND HEALTH CARE

Ensure the timely, reliable and cost-effective availability of isotopes for use in U.S. industry, research, and health care. Reduce dependence on foreign markets for molybdenum-99, which is used in 15 million diagnostic medical tests per year in the U.S. **(NE)**

☐ *Success will be measured by :*
- *Issuing the Environmental Impact Statement and reaching a Record of Decision by April 1996 on establishing a domestic source of molybdenum-99 production.*
- *Demonstrating a domestic source capability for molybdenum-99, through production of at least 30 curies of molybdenum-99 per week by September 1996.*
- *Improving the on-time delivery rate from 91 to 95 percent by January 1996 for all isotopes.*
- *Working with U.S. industry to identify by the end of September 1996 at least five specific activities now conducted by the DOE Isotope Production and Distribution program that can be privatized within one year.*

ST-8 PROVIDING RADIOISOTOPE POWER SYSTEMS FOR U.S. SPACE EXPLORATION

Provide the Radioisotope Thermoelectric Generators (RTGs) and Radioisotope Heater Units (RHUs) for current National Aeronautics and Space Administration (NASA) missions and maintain the infrastructure and capability to produce radioisotope power systems for the future. **(NE)**

☐ *Success will be measured by:*
- *Delivering by August 1996, three RHUs for the Mars Pathfinder mission to be launched in December 1996.*
- *Completing fabrication of 157 RHUs for the 1997 Cassini mission to Saturn by September 1996.*
- *Completing by August 1996 fabrication of two of the three heat sources to be placed in the RTGs for the Cassini mission.*

ST-9 RESTRUCTURING THE FUSION ENERGY RESEARCH PROGRAM

Preserve the fusion energy science base and maintain fusion as a U.S. energy option for the future. **(ER)**

☐ *Success will be measured in FY 1996 by incorporating the Fusion Energy Advisory Committee recommendations and finalizing the strategy by February 1996 to restructure the fusion energy research program to emphasize fusion energy science.*

ST-10 ADVANCING THE STATE OF THE ART IN HIGH PERFORMANCE COMPUTING

Advance the state-of-the-art in high performance computing and apply these capabilities to DOE and national priorities, such as national security, environmental cleanup, world leadership in science and technology, and economic productivity. **(ER)**

☐ *Success will be measured in FY 1996 by:*
- *Completing a roadmap for development and deployment of advanced communications and computing technologies to create "National Collaboratories", as envisioned in the DOE 2000 initiative to improve research productivity.*
- *Developing computational software, in collaboration with Electric Power Research Institute and others, for the President's National Information Infrastructure initiative, to improve energy supply and demand management for utility companies.*

ST-11 EXPANDING ACCESS TO GLOBAL SCIENCE THROUGH THE INFORMATION INFRASTRUCTURE

Facilitate open access to the Department's programmatic, scientific, and technical information by providing better communications with U.S. industry, academia, the scientific community, and the public. Capitalize on interagency and international collaborations to benefit the U.S. **(ET)**

☐ *Success will be measured by:*

- *Creating the following four new mechanisms for public access to global energy-related information, resulting in a 20 percent increase in service to customers, measured by surveys and programmed feedback for each product through:*
    - *listing of DOE scientific and technical information resources in a centralized government directory,*
    - *the Openness Initiative Information, to be available through open systems networks by March 1996,*
    - *electronic delivery of formerly printed products by June 1996, and*
    - *30 percent increase in full text electronic access to R&D information by September 1996.*

ST-12 DIVERSIFYING AMERICA'S SCIENCE WORKFORCE

Work with minority educational institutions to diversify and develop an effective scientific and technical workforce. **(ED)**

☐ *Success will be measured by:*

- *Increasing awards to Historically Black Colleges and Universities, Hispanic-serving institutions, Native American, and other minority institutions from over $58 million in FY 1995 to over $100 million.*
- *Showcasing research accomplishments and forging at least three cooperative research and development agreements and partnerships with minority educational institutions.*

ST-13 EDUCATING YOUNG SCIENTISTS

Use the science and technology at the national laboratories to increase knowledge, analytical thinking and research capabilities of faculty and students through hands-on experience. **(ET)**

☐ *Success will be measured by the participation of 5,000 undergraduate, graduate, postdoctoral students and faculty in DOE science education programs at our national laboratories in FY 1996 that results in 40 percent of the participants showing an increase in knowledge and skills as measured by surveys developed in collaboration with other Federal agencies.*

NATIONAL SECURITY

Support and maintain a safe, secure, reliable, and smaller nuclear weapons stockpile without underground nuclear testing; dismantle excess weapons; and provide technical leadership for national and global nonproliferation to reduce the continuing and new nuclear dangers in the world.

OUR COMMITMENTS

NS-1 REDUCING THE WEAPONS STOCKPILE

Safely reduce the U.S. nuclear weapons stockpile in order to reduce the nuclear danger and enhance international accord. **(DP)**

☐ *Success will be measured by dismantling 1,164 weapons in FY 1996 without adversely impacting the environment, public safety and health.*

NS-2 REPLACING UNDERGROUND TESTING WITH SCIENCE

Redirect the DOE weapons programs to maintain confidence in the enduring stockpile through the science-based Stockpile Stewardship Program. **(DP)**

☐ *Success will be measured by :*
  - *Developing the Accelerated Strategic Computing Initiative Implementation Plan by April 1996 to improve simulation capabilities.*
  - *Demonstrating the Los Alamos Neutron Scattering Center's (LANSCE) concept of fast neutron radiography of weapons systems to detect small scale (2-3 mm) defects by September 1996.*
  - *Developing a new annual certification process with the National Security Council.*
  - *Completing an integrated program plan for stockpile stewardship and management by March 1996.*
  - *Conducting enhanced nonnuclear experiments on existing stockpile weapons and improving predictive techniques to repair or replace aging weapons.*

NS-3 MAINTAINING RELIABILITY OF THE FUTURE STOCKPILE

Develop a replacement source for tritium to ensure the U.S. nuclear weapons stockpile remains reliable. **(DP)**

☐ *Success will be measured by:*
  - *Publishing the final Programmatic Environmental Impact Statement in November 1995 and the Record of Decision in December 1995 in support of a new tritium production source.*
  - *Selecting a prime contractor for the accelerator design by September 1996.*
  - *Issuing a request for proposal for supplying tritium through commercial reactors or irradiation services.*

NS-4 DETERMINING THE FUTURE SIZE AND SCOPE OF THE NUCLEAR WEAPONS COMPLEX

Decide on the appropriate size and scope of the nuclear weapons complex. **(DP)**

☐ *Success will be measured by:*
- *Issuing the draft Programmatic Environmental Impact Statement (PEIS) for stockpile stewardship and management in February 1996.*
- *Issuing the final PEIS for stockpile stewardship and management in June 1996, and*
- *Issuing the Record of Decision on stockpile stewardship and management in August 1996.*

NS-5 DESIGNING AND CHOOSING A POTENTIAL SITE FOR THE NATIONAL IGNITION FACILITY

Design and select a site for an above-ground experimental physics facility to simulate on a small scale the conditions during a nuclear weapons detonation in order to maintain confidence in the enduring nuclear weapons stockpile. Decide whether to request funding to proceed with the construction of the facility. **(DP)**

☐ *Success will be measured by:*
- *Completing the nonproliferation assessment by December 1995.*
- *Finishing the preliminary design by September 1996.*
- *Deciding on the specific site for construction of the National Ignition Facility as part of the Record of Decision for stockpile stewardship and management.*

NS-6 MANAGING SURPLUS WEAPONS-USABLE FISSILE MATERIALS

Define and implement a path forward for verifiable storage and disposition of U.S. weapons-usable fissile materials and support efforts to attain reciprocal actions for disposition of surplus Russian plutonium. **(MD)**

☐ *Success will be measured by:*
- *Publishing by February 1996 a draft and by September 1996 the final Programmatic Environmental Impact Statement for storage and disposition of weapons-usable fissile materials.*
- *Completing by May 1996 a final Environmental Impact Statement for downblending surplus weapons-usable uranium into low enriched uranium for potential use in commercial reactor fuel.*
- *Completing by September 1996 a United States/Russian joint study to develop a set of consistently evaluated plutonium disposition alternatives.*

NS-7 ASSISTING RUSSIA AND NIS IN IMPROVING THE SECURITY OF NUCLEAR MATERIALS

Work with Russia and the Newly Independent States (NIS) to improve material protection, control and accounting (MPC&A) activities at nuclear facilities that contain weapons-usable nuclear material. Develop with their scientists MPC&A equipment suitable for mass production and use in their nuclear complexes. Work with national authorities in instituting and standardizing MPC&A activities (civilian and military). **(NN)**

☐ *Success will be measured by:*
- *Expanding MPC&A upgrades at the 26 facilities currently underway, adding additional facilities to be upgraded, and including Russian-manufactured personnel security equipment in these upgrades.*
- *Initiating MPC&A training for Russian national regulatory authorities from each region and beginning procurement of equipment for the Russian nuclear regulatory authority inspections by May 1996.*
- *Developing a preliminary design for a national Russian nuclear materials accounting system by July 1996.*

NS-8 LIMITING WEAPONS-USABLE FISSILE MATERIALS WORLDWIDE

Promote alternatives to the civilian use of plutonium (Pu). Eliminate the civilian use of highly enriched uranium (HEU). Reduce stockpiles of HEU and Pu. Initiate regional fissile material control activities. Assist the shutdown of Russian Pu production reactors. Negotiate an international convention to end the production of fissile material for weapons purposes. **(NN)**

☐ *Success will be measured by:*
- *Recommending a preferred alternative regarding the acceptance of spent fuel from foreign research reactors by October 1995, issuing the Environmental Impact Statement in November 1995, and issuing the Record of Decision in January 1996.*
- *Working with the German government to redesign the planned FRM-II research reactor to use low enriched uranium.*
- *Supporting the June 1994 Gore-Chernomydrin Commission agreement to shutdown the Russian plutonium production reactors in Tomsk-7 and Krasnoyarsk-26 by the year 2000. Complete technical analyses on nuclear replacement power options by December 1995 and an analysis of fossil fuel replacement power options by July 1996.* *(NE)*

NS-9 ESTABLISHING TRANSPARENT AND IRREVERSIBLE NUCLEAR REDUCTIONS WORLDWIDE

Exchange and confirm data on weapons materials inventories. Monitor nuclear warhead production and expedite dismantlement of excess weapons under bilateral agreements. Conduct reciprocal bilateral inspections of nuclear components and materials. Implement the purchase agreement of the 500 metric tons of HEU from dismantled former Soviet Union warheads. Work to reduce weapons inventories. (NN)

☐ *Success will be measured in FY 1996 by:*

- *Implementing the draft agreement with Russia initialed in November 1995, implementing transparency measures for the Ural Electrochemical Integrated Enterprise (UEIE) and the Portsmouth Gaseous Diffusion Plant.*
- *Finalizing annexes to the agreement with Russia.*
- *Before the 6th Gore-Chernomyrdin Commission meeting, resolving issues of timely payment to Russia for the natural uranium used to convert the HEU into low enriched uranium.*
- *Supporting White House efforts to obtain Congressional approvals for Presidential authority to waive anti-dumping duties against uranium imported into the U.S. under the HEU Purchase Agreement.*
- *Obtaining the low enriched equivalent of 12 metric tons of HEU.*

NS-10 STRENGTHENING THE NUCLEAR NONPROLIFERATION REGIME

Promote adherence to the Nuclear Non-Proliferation Treaty. Increase the effectiveness and efficiency of the International Atomic Energy Agency (IAEA). Conclude successful negotiation of a Comprehensive Nuclear Test Ban Treaty. Facilitate IAEA inspections of excess fissile materials. Promote regional nonproliferation measures. (NN)

☐ *Success will be measured by:*

- *Providing direct technical assistance for IAEA inspections in North Korea and Iraq.*
- *Implementing 11 agreements for safeguards cooperation between DOE and foreign governments or organizations (Argentina, Australia, Brazil, EURATOM, France, Germany, Japan, South Korea, United Kingdom, IAEA, and ABACC).*
- *Beginning IAEA inspections of excess plutonium at Rocky Flats by December 1995, bringing the amount of excess fissile material under IAEA safeguards to approximately 12 metric tons.*
- *Placing 13 metric tons of U.S. highly enriched uranium hexafluoride (part of the 200 metric tons of U.S. weapons-grade material declared excess by the President) under IAEA safeguards by the second quarter of FY 1996.*
- *Blending at least four metric tons of weapons-grade uranium down to commercial levels by September 1996.* (NE)

NS-11 CONTROLLING NUCLEAR EXPORTS

Assist the international community in effectively controlling exports and establishing responsible supplier policies. Implement U.S. statutory licensing requirements for nuclear export controls. Encourage adherence to the Nuclear Suppliers Guidelines. Strengthen multilateral supplier initiatives. Foster transparency through automated information sharing and analysis. Advance nonproliferation objectives through technology security. (NN)

☐ *Success will be measured by:*
- *Adopting the Nuclear Suppliers Group Information Sharing System at the April 1996 Nuclear Suppliers Group Plenary Meeting in Buenos Aires.*
- *Enlisting new signatories to the Nuclear Suppliers Guidelines: China, Brazil, Ukraine, and Turkey by April 1996.*
- *Completing technical reviews of three non-sensitive fuel cycle technologies which trigger multilateral nuclear export controls and seeking formal adoption of a revised list at the May 1996 meeting of the Nonproliferation Treaty Exporters Committee.*
- *Expanding to four additional countries during FY 1996, training in strategic material identification and illicit trafficking prevention, in order to improve export control systems in Russia, the other Newly Independent States, and Eastern Europe.*

NS-12 ENHANCING THE SAFETY OF SOVIET-DESIGNED REACTORS

Increase the safety of Soviet-era nuclear powerplants in countries of Central and Eastern Europe and the Newly Independent States. (NE)

☐ *Success will be measured in FY 1996 by the Department continuing to increase the operational safety of Soviet-designed nuclear power plants and enhancing the safety cultures in the countries that operate them, by:*
- *Completing draft emergency procedures for all four types of Soviet-era nuclear plants.*
- *Improving training of power plant operators by providing training simulators for five nuclear power plants and training 150 plant staff through seven operator exchange visits by the end of FY 1996.*
- *Assisting the nuclear regulator in Ukraine by completing the training on licensing dry casks for spent fuel storage by June 1996, and in Russia by providing key U.S. DOE safety documentation for large research reactors and fuel cycle facilities, and completing several technical workshops by October 1996.*
- *Improving performance of safety systems at four nuclear power plants by installing fire detection systems and removing fire hazards by installing DC power supplies and by providing an emergency water supply system by September 1996.*

NS-13 ASSISTING IN THE SHUTDOWN OF THE CHORNOBYL NUCLEAR POWER PLANT

Facilitate the closure of the Chornobyl nuclear power plant in Ukraine and reduce safety risks during the plant's remaining operating period. (NE)

☐ *Success will be measured by:*
- *Providing improved fire safety and other safety equipment; completing a joint U.S./Ukrainian risk assessment of operating Chornobyl Unit 3; and preparing a preliminary decommissioning plan for Units 1 through 3.*
- *Establishing the International Nuclear Safety and Environmental Research Center at Slavutich, Ukraine near Chornobyl by April 1996 to coordinate nuclear safety research.*
- *Transferring dry cask spent fuel storage technology, including three casks and a transporter, to Ukraine and evaluating Ukraine's spent fuel management and disposal requirements and options by September 1996.*

NS-14 MANAGING WORKFORCE RESTRUCTURING

Assure fair treatment of workers and communities affected by changing DOE missions through a cost- effective workforce restructuring process that allows an average cost per separation of $25,000. The workforce restructuring since 1994 will result in a total savings of $3 billion per year. (WT)

☐ *Success will be measured by:*

- *Limiting the involuntary separation of prime contractor employees due to workforce restructuring to 20-33 percent by sponsoring voluntary separation, transfers and retraining.*
- *Ensuring reemployment of at least 60 percent of separated workers seeking new jobs by sponsoring community-based businesses, career assistance programs, further education and retraining programs.*
- *Ensuring that at least 66 percent of the affected workers are satisfied with DCE's workforce restructuring process.*
- *Establishing a workforce planning system with a database on workers' abilities by September 1996.*
- *Establishing a departmental policy for the treatment of contractor employees affected by organizational changes such as contract reform, privatization and outsourcing.*

ENVIRONMENTAL QUALITY

Protect public health and the environment by understanding and reducing the environmental, safety, and health risks and threats from DOE facilities and develop the technologies and institutions required for solving domestic and global environmental problems.

OUR COMMITMENTS

EQ-1 UNDERSTANDING AND DEALING WITH THE RISKS

Utilize newly developed information to maximize risk reduction and risk prevention associated with environmental problems resulting from nuclear weapons production during the Cold War. **(EM)**

☐ *Success will be measured by:*
- *Completing the sampling, analysis and characterization of 25 high-level radioactive waste tanks at Hanford.*
- *Finishing an analysis of DOE "materials in inventory," including a path forward for at least 10 material types, including lithium, chemicals and weapons components.*
- *Submitting to Congress in May 1996 an updated Baseline Environmental Management Report that will improve the accuracy of cost data over the 1995 report. This report will analyze the long-term cost impact of delaying or accelerating funding rates.*

EQ-2 MAKING PROGRESS ON MIXED WASTE TREATMENT

Continue working with state and EPA regulators to reach agreements and implement plans to treat sites with low level mixed waste. **(EM)**

☐ *Success will be measured by:*
- *Reaching agreements at seven remaining sites by December 1995.*
- *Meeting the 130 milestones for FY 1996 for waste characterization and treatment activities, including:*
    - *awarding a contract for privatized treatment of certain waste streams at the Oak Ridge Reservation and the Hanford site,*
    - *requesting proposals for an advanced mixed waste treatment facility at the Idaho National Engineering Laboratory,*
    - *starting operations of the Consolidated Incineration Facility at the Savannah River Site, and*
    - *treating more than 180,000 cubic meters of mixed waste.*

EQ-3 REDUCING THE RISKS; CLEANING UP NUCLEAR WEAPONS SITES

Reduce environmental, safety and health risks by cleaning up DOE sites. **(EM)**

☐ *Success will be measured by:*
  - *Completing 120 environmental cleanup actions.*
  - *Stabilizing 250 Kg of plutonium residues and solutions at the Hanford and Savannah River sites.*
  - *Finishing 12 decommissioning projects and 154 Uranium Mill Tailings Remedial Action (UMTRA) property clean-ups.*
  - *Treating and/or disposing of more than 3 million cubic meters of DOE waste, including starting up vitrification of high-level radioactive waste at the Defense Waste Processing Facility in Savannah River by December 1995 and at the West Valley Demonstration Project by March 1996.*

EQ-4 FINDING SOLUTIONS TO SPENT NUCLEAR FUEL STORAGE AND FUNDING ISSUES

Refocus the Civilian Radioactive Waste Management Program to provide meaningful deliverables, that are consistent with reduced funding and revised policies. **(RW)**

☐ *Success will be measured by:*
  - *Issuing by March 1996 a revised program plan to determine the suitability of the Yucca Mountain site.*
  - *Preparing a plan by September 1996 that identifies the steps to ensure an aggressive start on interim storage of spent fuel, should enabling legislation be enacted.*
  - *Completing by March 1996 2.5 miles of the exploratory tunnel and beginning two test alcoves in the potential repository formation at Yucca Mountain.*

EQ-5 SHUTTING DOWN AND CLEANING UP SURPLUS NON-WEAPONS NUCLEAR REACTOR SITES

Safely deactivate surplus nuclear facilities, including the Fast Flux Test Facility (FFTF) reactor in Washington and the Experimental Breeder Reactor-II (EBR-II) in Idaho, and prepare wastes for interim storage and ultimate disposition. **(NE)**

☐ *Success will be measured by:*
  - *Completing critical steps to deactivate the FFTF by:*
    - *washing and packaging 56 of 382 FFTF spent fuel assemblies into interim storage casks and placing the casks in secure storage by September 1996,*
    - *removing fresh fuel and eliminating unneeded security at the FFTF by September 1996, thus saving $500,000 annually, and*
    - *completing construction of the Sodium Processing Facility by September 1996 to stabilize coolant drained from the FFTF.*
  - *Completing 86 percent of the EBR-II fuel removal by September 1996. All fuel will be removed from the reactor by December 1996.*

EQ-6 ENSURING ENVIRONMENTAL JUSTICE

Implement the Department's plan to reduce disproportionate negative impacts of our operations and facilities on low-income and minority communities by accelerating waste management, pollution prevention, and environmental remediation activities. **(ED)**

☐ *Success will be measured by:*
  - *Increasing the removal of organic solvents from soil and groundwater within the "A/M" area of the Savannah River Site by 74 percent by September 1996.*
  - *Initiating construction of an interim cap to prevent the migration of contaminants from the Old Burial Ground at the Savannah River Site by September 1996.*
  - *Initiating clean up activities near the East Fork Poplar Creek community at the Oak Ridge Site by April 1996.*
  - *Implementing an environmental justice communications strategy plan for affected communities.*

EQ-7 PREVENTING FUTURE POLLUTION

Implement pollution prevention programs that pay for themselves through productivity gains and the avoidance of future waste management costs.

(EM)

☐ *Success will be measured by:*

- *Issuing pollution prevention performance measures and waste reduction goals by March 1996 to be achieved by the year 2000.*
- *Ensuring that half of DOE's purchases of EPA-designated products contain recycled or recovered materials.*
- *Initiating 20 additional projects in FY 1996 that will yield net savings of at least $30 million over a three year period.*
- *Completing analysis and issuing a report by March 1996 concerning the contamination resulting from each step of nuclear weapons production to prevent future generation of waste.*

ENERGY RESOURCES

Develop and promote energy efficient and renewable energy technologies; advance the efficient and environmentally responsible production, trans-portation, and use of domestic fossil fuels and other conventional energy sources; promote development of sustainable energy technologies with high export potential; promote an equitable system of energy supply and end use; and reduce U.S. vulnerability to energy supply disruptions.

OUR COMMITMENTS

ER-1 TRANSFERRING PROVEN ENERGY EFFICIENCY MEASURES

Apply energy efficiency measures to buildings and operations to reduce government energy consumption by 30 percent by 2005, save low-income residents over $10 million in annual energy costs and reduce energy consumption by one quad by the turn of the century. (EE)

☐ *Success will be measured by:*

- *Adding six new major Energy Savings Performance Contracts, including an innovative government-wide contract to make it simpler, cheaper and faster for government agencies to save energy.*
- *Applying the 15 energy and money saving technologies used in the "Greening of the White House" to three additional showcase buildings and existing Federal facilities. Adapting these technologies will save taxpayers and their Federal agencies $50 million in energy costs in 1996, 10% from DOE facilities and, attract double the current private investment for new Federal facility energy projects, accumulating $60 million by year's end.*
- *Weatherizing 83,300 more low income homes, for a total of 4.4 million homes, which will save those residents a total of $450 million in energy costs every year.*

ER-2 DESIGNING AND DELIVERING CARS OF THE FUTURE

Lead the design team, of the multi-agency and industry Partnership for a New Generation Vehicle, with the goal of developing an 80 mile-per-gallon family car. Deliver the individual technologies in new car models as they are proven effective and demonstrate a prototype car of the future by 2004. (EE)

☐ *Success will be measured by:*

- *Delivering fuel cell, battery, turbocharger, generator and diesel prototype technologies for demonstration, testing and pilot production.*
- *Adding the final "engine" project partnership, completing the planned R&D team and portfolio needed to design and build the prototype family car.*
- *Adding 15,000 alternative fuel vehicles to the existing 27,000 car fleet in 50 Clean Cities, including 15 new cities this year. The new vehicles will reduce annual oil imports by an additional 4 million gallons, increasing the program savings to eleven million gallons a year.*

ER-3 DEVELOPING RENEWABLE DOMESTIC ENERGY

Advance renewable energy development through cost-shared industry, laboratory and DOE partnerships. By the year 2000, add 15 gigawatts (GW) of renewable based capacity, increase annual production and sales of renewable technology by the equivalent of 5 GW of new capacity every year, and create 30,000 industry-driven high-technology jobs. **(EE)**

☐ *Success will be measured by:*

- *Developing the U.S. renewable industry through $400 million of foreign and domestic sales.*
- *Showcasing 25 energy efficiency and renewable energy technologies at the 1996 Summer Olympic Games in Atlanta to over 2 million visitors and 3 billion viewers.*
- *Attracting $100 million of private sector investment to cost share our R&D in renewable technologies.*

ER-4 BOOSTING THE NATION'S PRODUCTION OF NATURAL GAS AND OIL

Improve the capability of the nation's petroleum industry to produce additional supplies of secure, domestic natural gas and oil, increasing U.S. gas and oil production by an average of 1 million barrels per day (oil equivalent) during the 2001-2010 period. **(FE)**

☐ *Success will be measured by:*

- *Demonstrating and/or transferring to industry, using national laboratory expertise, at least six new geophysical imaging technologies that will improve exploratory well success rates from a current average of 40 percent to 50 percent.*
- *Demonstrating at least five new data processing and simulation methods for applying advanced computing technology developed by national laboratories for other government programs to improve domestic prospects for producing natural gas and oil.*

ER-5 PROVIDING A NEW OPTION TO SUPPLEMENT THE NATION'S LIQUID FUELS

Provide the nation by 2005 with an alternative source of liquid fuels, costing $25 per barrel or less, that can be produced from coal and solid wastes. **(FE)**

☐ *Success will be measured by:*

- *Completing an initial series of laboratory-scale baseline tests that verify the potential for significantly reducing the cost of producing liquid fuels by processing coal with plastics, rubber or other solid wastes.*

ER-6 REDUCING U.S. VULNERABILITY TO ENERGY SUPPLY DISRUPTIONS

Ensure by the year 2000 the readiness of the Strategic Petroleum Reserve (SPR) to drawdown 585 million barrels (MMB) of crude oil at a sustainable rate of 3.9 MMB/day within 15 days of direction from the President. (See Commitment EP-4.) **(FE)**

☐ *Success will be measured by:*

- *Degasifying an additional 61 million barrels of inventory to increase drawdown capability from 3.2 to 3.4 MMB/day and inventory availability to 510 MMB.*
- *Implementing an additional 22 percent of the infrastructure life extension program thereby completing nearly half of the program.*
- *Completing transfer or sale of 80 percent of 72 million barrels of oil from the Weeks Island storage site to a more geologically stable site ensuring the availability of this oil.*

ER-7 DEVELOPING THE CLEAN, HIGH EFFICIENCY POWER PLANT OF THE 21ST CENTURY

Provide the nation's electric power industry from 2,000 to 2,010 with a new generation of natural gas and coal power technologies that progressively reduce CO_2 emissions by 30 to 50 percent, lower SO_2 and NOx emissions to as little as 1/10th of the levels mandated by current Federal standards, and produce electricity at costs 10 to 20 percent below today's conventional plants. **(FE)**

☐ *Success will be measured by:*

- *Continuing accomplishments in the Clean Coal Technology Demonstration Program, including:*
  - *starting up the nation's first two full commercial-scale coal gasification-combined cycle facilities, both achieving 96 percent or greater SO_2 removal and NOx reductions of at least 90 percent and*
  - *demonstrating the market readiness of two more advanced pollution control retrofit technologies that can remove up to 70 percent of NOx and SO_2 pollutants.*
- *Demonstrating a low-cost combustion gas additive that increases SO_2 emissions removal from 92 percent to 98 percent in wet scrubbers, and reduces cost from about $300 to $50 to $100 per additional ton of SO_2 removed.*
- *Beginning the test runs of the first two complete natural gas molten carbonate fuel cell plants — one for utility power generation, the other for onsite cogeneration — that will lead to a 60 percent-efficient market-ready fuel cell system by the year 2000.*
- *Moving two U.S. natural gas turbine technologies into the large-scale component development stage, leading by 2000 to a full-scale prototype of a 60 percent-efficient, ultra-low NOx advanced gas turbine system.*

ER-8 CERTIFYING THE NEXT GENERATION OF NUCLEAR POWER PLANTS

Establish standardized designs and complete the testing and other activities necessary to receive NRC certification of the next generation of light water reactors that will be simpler, safer and less expensive to build and operate than existing plants. (NE)

☐ *Success will be measured by:*

- *Supporting design certification by the NRC for the Advanced Boiling Water Reactor by the end of FY 1996.*
- *Supporting design certification by the NRC for the System 80+ by the end of FY 1996.*
- *By April 1996, completing testing and test analysis reports for the AP-600 nuclear plant design that are needed to support issuance by NRC of the Supplemental Draft Safety Evaluation Report.*

ER-9 IMPLEMENTING INTERNATIONAL CLIMATE CHANGE INITIATIVES

Monitor and mitigate greenhouse gas emissions and achieve U.S. goals under the Climate Change Treaty. **(PO)**

☐ *Success will be measured in FY 1996 by:*

- *Conducting an interagency evaluation of the second round of theU.S. Initiative on Joint Implementation proposals and awarding the winning proposals by December 1995. These actions are estimated to reduce carbon emissions by more than 5 million metric tons in the developing countries by the year 2000.*
- *Completing the first round of 56 climate change country studies, which will produce each country's greenhouse gas emission inventories, risks associated with climate change, and mitigation plans to reduce or capture greenhouse gas emissions.*

ER-10 IMPLEMENTING THE CLIMATE CHANGE ACTION PLAN

Support the President's Climate Change Action Plan to reduce carbon emissions by over 23 million metric tons, produce $15 billion in energy savings, and stimulate $20 billion in industrial investment, by the year 2000. **(EE)**

☐ *Success will be measured by:*

- *Increasing sales of the most energy efficient appliance and building equipment by $50 million this year through eight industry collaboratives and four of the biggest national appliance retailers. This program,* ***Energy Saver****, will save enough energy to eliminate 8 million metric tons of carbon by 2000.*
- *Tripling industry* ***Climate Wise*** *commitments to voluntarily reduce carbon emissions by adding 100 additional industrial companies and two new Climate Wise Trade Associations. Our industrial partners are improving their competitive position by recycling, eliminating waste and saving energy, enough to reduce carbon emissions by 4 million metric tons by 2000.*
- *Awarding 16 new NICE^3 grants to industry and government cost-shared projects that will demonstrate new cost-effective clean energy technologies, attracting five investor dollars for every Federal dollar and reducing our year 2000 carbon emissions by nearly 2 million metric tons.*
- *Implementing our 21 new Showcase national partner demonstration projects for electric motor drives and systems in our* ***Motor Challenge*** *program, saving businesses $4 million this year and taking more than 5 million metric tons of carbon out of the air by the year 2000.*
- *Nearly doubling the community and regional partnerships to improve commercial building energy efficiency. The 90* ***Rebuild America*** *partnerships - 40 are new this year - attract an average of $30 of private investment for every public dollar. By the year 2000 the buildings adopting the* ***Rebuild*** *energy savings practices will save their communities over $2 billion and take over 1 million tons of carbon out of the air.*
- *Adding 40 new utilities to our 108* ***Climate Challenge*** *agreements to voluntarily reduce emissions. By the end of the year we will have 600 partner utilities, that account for two-thirds of utility carbon emissions. We expect our utility partners to increase their ongoing energy saving programs enough to take an additional 7 million metric tons of carbon out of their service areas by the year 2000.*

ER-11 MAXIMIZING THE VALUE OF FEDERAL OIL FIELDS

Maximize the value to the taxpayer of the Naval Petroleum and Oil Shale Reserves by divesting them to the private sector, subject to Congressional authorization, before the end of FY 1997. **(FE)**

☐ *Success will be measured by:*

- *Offering the government-owned and operated commercial oil field at Elk Hills for sale to the private sector.*
- *Prior to the sale, operating the Reserves in FY 1996 so as to achieve net revenues in the range of $217 to 256 million to the Treasury.*

ECONOMIC PRODUCTIVITY

Promote sustained U.S. economic growth that stimulates crealion of high-wage jobs, diversity in research and development collaborations, efficiency and pollution prevention, and global DOE technology usage and exports.

OUR COMMITMENTS

EP-1 INCREASING U.S. ENERGY TECHNOLOGY EXPORTS AND INVESTMENTS

Stimulate sales of U.S. energy technology and capital investments in countries with large, emerging markets. Diversify world wide supply through targeted support for U.S. industry efforts to invest in new oil and gas supplies and energy efficiency and renewable technologies. **(EE/FE)**

☐ *Success will be measured by:*

- *Promoting the U.S. renewable industry in fostering foreign and domestic sales of $400 million, and foreign sales agreements representing $1.5 billion in sales. (EE)*
- *Removing barriers to U.S. companies in coal technology export and efficiency and renewables markets, including those in China, Brazil and other developing countries that will use coal, by:*
  - *establishing U.S. and foreign partnerships and*
  - *providing technical expertise to mulilaterial and regional financing institutions in evaluation of finance applications. (FE)*
- *Initiating a forum, similar to that done for the Western Hemisphere, for Arctic oil and gas practices with the Russian producing associations. (FE)*
- *Opening of oil, gas, energy efficiency and renewable technology opportunities for U.S. companies by Ukraine . (EE/FE)*

EP-2 IMPROVING EFFICIENCY IN ENERGY INTENSIVE INDUSTRIES

Work with the most energy-intensive industries to focus cooperative research, increase energy and resource efficiency and Improve U.S. competitiveness resulting in over $20 billion of industry energy cost saving by the year 2000. **(EE)**

☐ *Success will be measured by:*

- *Signing partnership agreements with the metal castings industry in October, chemical industry by June, glass industry by September, and aluminum industry by September to achieve "Industrial Visions of the Future", which include economic, energy efficient, and environmentally superior technologies.*
- *Beginning four new technology roadmaps with industry representatives teaming and cost-sharing with DOE programs, researchers and laboratories.*

EP-3 ACCELERATING FEDERAL AND PRIVATE SECTOR TECHNOLOGY DEVELOPMENT THROUGH PARTNERSHIPS

Enhance the Department's research impact through partnerships with industry and increase the amount of research performed for and with other government agencies and the private sector. **(DS)**

☐ *Success will be measured in FY 1996 by:*

- *Increasing the program-supported DOE laboratory R&D funding that is leveraged with the private sector from $108 million in FY 1995 to $158 million in FY 1996.*
- *Demonstrating the value of the laboratories and facilities to the nation by increasing private sector funded R&D at the labs by at least 10 percent over 1995.*
- *Developing by June 1996 a measurement process that documents mission benefits derived through partnerships, such as the improved productivity of laboratory research.*

DOE's Critical Success Factors

The Department has adopted Total Quality Management principles to drive our National Performance Review initiatives to improve overall effectiveness and reduce costs. We will meet or exceed customer requirements and make DOE a professional and personally rewarding place to work. DOE has focused on **FOUR FACTORS** critical to successfully realize the Department's mission:

Communication and Trust

Communicate our new post-Cold War missions in an environment of openness, communication, and trust.

Our Commitments

CT-1 MAKING MORE INFORMATION AVAILABLE TO THE PUBLIC

Declassify information under the Atomic Energy Act and Executive Order 12958, reduce the volume of new information classified and make information more accessible. **(NN)**

☐ *Success will be measured by:*
- *Reviewing 440,000 documents for possible declassification.*
- *Completing a survey of classified DOE records for declassification and making public a list of records reviewed.*
- *Completing declassification and release of 15 percent of historically significant national security information records 25 years old and older.*
- *Issuing the final report on Fundamental Classification Policy Review and implementing its recommendations for declassifications.*
- *Making available on the Internet a list of unclassified documents on Human Radiation Studies.*

CT-2 IMPROVING SERVICES TO CUSTOMERS AND STAKEHOLDERS

Develop techniques to improve delivery of services and products to customers and stakeholders. **(HR)**

☐ *Success will be measured by:*
- *Eliminating the 1993 to 1994 backlog of 208 Freedom of Information Act (FOIA) cases.*
- *Centralizing FOIA/Privacy Act headquarters operations to ensure compliance with the 10-day statutory response time.*

CT-3 INVOLVING STAKEHOLDERS IN THE POLICY MAKING PROCESS

Assure that the business of DOE will be open to the full view and input of those whom it serves, consistent with applicable laws, regulations and contracts.
(EM)

☐ *Success will be measured by:*
- *Ensuring that Environmental Management decisions consider the input of site specific groups.*
- *Completing a third national survey of DOE stakeholders' attitudes, needs and expectations of DOE by July 1996 to assess the Department's progress against the FY 1993 baseline.*

HUMAN RESOURCES

Create an environment where teamwork, trust, openness, pride and respect are standard practices, and excellent performance is rewarded. Provide meaningful work opportunities and implement innovative compensation and personnel initiatives to attract and retain a diverse and well-trained workforce, capable of carrying out DOE's new mission.

OUR COMMITMENTS

HR-1 STREAMLINING MANAGEMENT STRUCTURE

Reduce management layers and encourage employee empowerment. **(HR)**

☐ *Success will be measured by:*
- *Increasing the worker to supervisor ratio to 11:1 from a ratio of 8:1 in September 1995.*
- *Decreasing the number of employees in senior level positions (SESs, GS 15s and 14s) by 194 from 5,568 at the end of FY 1995.*

HR-2 ENSURING WORKFORCE DIVERSITY

Recruit, hire and retain a diverse workforce and assure that DOE contractors achieve diversity. **(ED)**

☐ *Success will be measured by:*
- *Maintaining diversity achievements during downsizing in FY 1996.*
- *Developing and implementing diversity strategies at all DOE field sites.*
- *Implementing the DOE strategic diversity plan at five additional reactor sites.*

HR-3 RECRUITING, REWARDING AND RETAINING TECHNICAL EXCELLENCE

Use personnel tools to attract and retain technical excellence. **(HR)**

☐ *Success will be measured by:*
- *Fully implementing the Technical Qualifications Program by December 1995 to cover all 2,800 technical employees involved in managing defense nuclear facilities.*
- *Updating all Individual Development Plans for the technical employees of defense nuclear facilities to incorporate the Technical Qualifications Program competencies.*
- *Increasing the technical to non-technical ratio for defense nuclear related positions to 1:0.8 by December 1996, from a ratio of 1:.85 in December 1995.*

HR-4 IMPROVING HUMAN RESOURCE PRACTICES

Develop techniques for ensuring management success in achieving performance goals critical to realizing the Department's mission. **(HR)**

☐ *Success will be measured in FY 1996 by:*

- *Implementing "360 Degree" performance feedback for all SES employees by collecting input from supervisors, peers, subordinates and customers and by obtaining input for all career SES employees during FY 1996.*
- *Beginning to implement the "360 Degree" process for non-SES supervisors and managers by March 1996.*
- *All managers receiving appropriate quality training by June 1996 and promoting training for their staffs.* (QM)
- *Establishing pilot partnership programs to reengineer how personnel services are delivered to customers, with a goal of reducing processing times of typical personnel services by 25 percent.*

HR-5 PROVIDING TRANSITION ASSISTANCE TO EMPLOYEES

Offer career transition assistance to minimize impacts of downsizing on Department employees. **(HR)**

☐ *Success will be measured by:*

- *Expanding services of the Career Management Resource Centers to provide transition assistance to headquarters employees by:*
  - *increasing the number of employees served by 20 percent, from 3,235 in FY 1995 to 3,880 in FY 1996,*
  - *increasing customer satisfaction (via users meeting specified personal objectives) from 75 percent in FY 1995 to 80 percent in FY 1996, and*
  - *increasing the number of workshops to aid employees in actions related to career transition by over 40 percent; from 22 workshops in FY 1995 to 36 in FY 1996.*
- *Increasing Departmental field sites with transition assistance services from four in FY 1995 to thirteen in FY 1996 as needed.*

ENVIRONMENT, SAFETY, AND HEALTH

Continue to shift from a reactive approach to an emphasis on prevention and excellence in protecting worker and public safety and health and in achieving environmental standards. Open the Department's records related to environment, safety and health and provide stakeholders easy access to this information.

OUR COMMITMENTS

EH-1 INCORPORATING THE EXISTING RISK-BASED PLANNING AND BUDGETING PROCESS INTO ALL MAJOR MANAGEMENT AND OPERATION CONTRACTS

By September 1996, incorporate the risk-based environment, safety, and health planning and budgeting process into all new major Management and Operation contracts and those that are scheduled for renewal. **(EH)**

☐ *Success will be measured by inclusion of strong and effective environment, safety, and health provisions in six Management and Operation contracts.*

EH-2 ELIMINATING SERIOUS VULNERABILITIES

By September 1996, complete Highly Enriched Uranium Vulnerability Study to identify environment, safety and health vulnerabilities. **(EH)**

☐ *Success will be measured by reducing the number of unaddressed serious highly enriched uranium vulnerabilities at DOE facilities to zero.*

EH-3 IMPLEMENT THE "NECESSARY AND SUFFICIENT CLOSURE PROCESS" TO ENSURE SAFE OPERATIONS IN A STREAMLINED ENVIRONMENT

Identify and implement appropriate standards for work being done that will provide for the health and safety of workers, the public and the environment. **(EH)**

☐ *Success will be measured by completing nine pilot projects initiated in FY 1995 and beginning the full implementation of this process into the Department's operations by February 1996.*

EH-4 INSTITUTIONALIZE A MULTI-DISCIPLINARY OVERSIGHT PROCESS

By September 1996, institutionalize a multi-disciplinary, fully integrated oversight process for evaluating environment, safety, health, and safeguards and security programs. **(EH)**

☐ *Success will be measured by completing value-added, comprehensive oversight evaluations, focusing on environment, safety, and health-management systems at eight DOE sites.*

MANAGEMENT PRACTICES

Adopt "Best in Class" management practices in conjunction with the Department's mission by meeting or exceeding customer expectations, by empowering and enabling people to be results-oriented and cost-effective, and by contributing to the Administration's deficit reduction objectives.

Take an integrated approach to managing headquarters, field and contractor operations that focuses on performance.

OUR COMMITMENTS

MP-1 ALIGNING THE DEPARTMENT TO SAVE MONEY AND ENHANCE PERFORMANCE

Implement the Strategic Alignment Initiative through office consolidations, business process re-engineering, and elimination of non-essential activities. **(FM)**

☐ *Success will be measured by:*

- *Closing eight field offices and four headquarters locations and reducing 1,380 Federal staff positions.*
- *Through process improvements saving $49 million in information resource management, $35 million in Federal and contractor travel and $5 million in National Environmental Policy Act compliance activities.*
- *Return $15 million to the Treasury from the sale of surplus assets.*

MP-2 BECOMING A WORLD CLASS QUALITY ORGANIZATION

Implement improvement action plans based on the results of the 1995 self-assessment. Conduct a 1996 self-assessment of DOE quality management practices using the President's Quality Award or Malcolm Baldridge National Quality Award Criteria. **(QM)**

☐ *Success will be measured by:*

- *Implementing quality improvement action plans by January 1996 at all Headquarters and Field Organizations;*
- *All headquarters and field organizations completing their annual quality self-assessment by September 1996;*
- *By demonstrating continuous performance improvement at all headquarters and field organizations in 1996 as compared with the results of their 1995 quality baseline self-assessment.*
- *By January 1996, completing the development of a system which aligns strategic and operational planning with strategic intent, ensures this planning drives resource allocation, involves regular evaluation of results, and provides feedback.* (PO)

MP-3 SETTING A NEW HIGH STANDARD IN CONTRACT MANAGEMENT

Establish a new legacy of improved contracting through the Department's solicitations and negotiations, facilitating privatization activities, and ensuring translation of contract reform into Department policies, procedures, and guidance. **(FM)**

☐ *Success will be measured by:*
- *Selecting contractors and incorporating contract reforms into contracts for four sites and for the 15 DOE facilities whose contracts are to be extended in FY 1996.*
- *Developing Departmental policy on privatization by April1996.*
- *Issuing a solicitation to privatize the treatment of tank waste at Hanford by February 1996.*
- *Publishing a proposed rulemaking by April 1996 which reflects Departmental policies on competition, contractor accountability, contractor fees, and make-or-buy decisions.*
- *Reducing support service contracts to $610 million by September 1996 from an FY 1994 baseline of $700 million.*

MP-4 REDUCING FEDERAL REGULATIONS

Eliminate unnecessary prescriptive requirements as well as nonessential processes, reports, forms, and directives. **(HR)**

☐ *Success will be measured by:*
- *Reducing the number of DOE operations offices' field directives from 856 in FY 1995 to 290 in FY 1996, a 66 percent decrease. Overall, the number of directives will have been reduced by 80 percent since this effort began in FY 1993.*
- *Achieving an additional 10 percent reduction in the number of headquarters directives from of 156 in FY 1995 to 140 in FY 1996.*
- *Reporting operational improvements realized as a result of the directives reduction efforts.*

MP-5 REDUCING THE OVERSIGHT BURDEN ON FIELD ACTIVITIES

Improve the efficiency of DOE oversight of field offices, laboratories and major contractors by consolidating oversight visits and simplifying technical reviews. **(DS)**

☐ *Success will be measured by:*
- *Improving the business management review process for field activities, reducing the number of oversight visits by 80 percent and associated costs by $10 million. (FM)*
- *Improving the technical review oversight process for the national laboratories, reducing the number of reviews and overall cost of oversight. (ER)*
- *Improving the program supported Environment, Safety and Health oversight process at six pilot laboratories and reducing associated costs by 30 percent. (DP)*

MP-6 EXTENDING USE OF DOE LANDS AND FACILITIES

Initiate comprehensive planning to integrate life cycle asset management goals of stakeholders and the Department and to determine ways to broaden the use of DOE lands and facilities. **(FM)**

☐ *Success will be measured in FY 1996 by:*
- *Initiating comprehensive land use planning processes at 40 of the Department's 50 major sites to set the context for future use decisions and to reduce duplicative planning efforts.*
- *Completing at least ten major actions to make land and facilities available for broader public use.*

MP-7 IMPROVING MANAGEMENT PRACTICES AT THE DEPARTMENT OF ENERGY'S LABORATORIES

Focus and clarify the missions of DOE laboratories, to simplify oversight practices and adopt "best business practices" to ensure efficient operations. **(DS)**

☐ *Success will be measured by:*
- *Reducing laboratory operating cost by $264 million in FY 1996 towards the goal of reducing these costs by $1.6 billion over the next five years.*
- *Establishing with the Laboratory Operations Board by February 1996:*
    - *- a process to define the missions of each multi-program laboratory, and*
    - *- a process to validate missions and privatization options for each single-program and special mission laboratory.*

Measurement and Monitoring of Performance

To maintain focus, a sense of urgency, and to have a real impact on performance, there will be periodic reviews of progress, discussion of difficulties encountered, and agreement on appropriate actions. These reviews will be held between the President and/or his designees and Department officials and, with greater frequency within the Department. Any specific reporting requirements will be developed jointly with the Department.

Administration Support

In order to accomplish the goals herein described, it is the Administration's objective to:

☐ Provide visible, high profile support for:
  - The Department's National Security programs, including the science-based stockpile stewardship program and the Department's leadership in reducing the global nuclear danger.
  - Maintaining the fusion energy option for the U.S.
  - International collaboration in major science facilities.
  - The Department meeting its environmental cleanup and compliance commitments.
  - Departmental efforts to expand international trade in energy technology for U.S. companies.
  - The Department's efforts to promote economic growth and protect environmental quality through advancing energy efficiency and renewable energy.

Terms of Agreement

This agreement is intended only to improve the internal management of the Executive Branch and is not intended to and does not create any right, benefit, trust or responsibility, substantive or procedural, enforceable by law or equity by any party against the United States, its agencies, its officers, or any person.

This agreement will remain in effect until modified. It is expected that it will be updated at least annually to reflect significant changes in budget, policy, personnel, or other factors that may affect the accomplishment of objectives.

This agreement represents our joint commitment to a Department of Energy that works better, costs less, and fulfills our sacred trust to the American People.

Hazel R. O'Leary

Hazel R. O'Leary
Secretary of Energy

William J. Clinton

William J. Clinton
President of the United States

SECRETARIAL OFFICERS' CONCURRENCE

We concur with the commitments made in this agreement with the President, and further agree to fulfill our individual responsibilities.

Charles B. Curtis
CHARLES B. CURTIS (DS)
Deputy Secretary

Dirk Forrister
DIRK FORRISTER (CP)
Assistant Secretary
Congressional, Public, & Intergovernmental Affairs

Christine A. Ervin
CHRISTINE A. ERVIN (EE)
Assistant Secretary
Energy Efficiency & Renewable Energy

THOMAS GRUMBLY (EM)
Assistant Secretary
Environmental Management

ARCHER L. DURHAM (HR)
Assistant Secretary
Human Resources & Administration

Jay E. Hakes
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PERFORMANCE AGREEMENT

BETWEEN

THE PRESIDENT OF THE UNITED STATES
WILLIAM JEFFERSON CLINTON

AND

DEPARTMENT OF ENERGY · UNITED STATES OF AMERICA

THE SECRETARY OF ENERGY
HAZEL R. O'LEARY

FISCAL YEAR 1995

Printed with soy ink on recycled paper

SECRETARY'S PERFORMANCE AGREEMENT

THE DEPARTMENT OF ENERGY

OVERVIEW

The Department of Energy's commitments for FY 1995 reflect the vision, goals, priorities and expectations of Secretary Hazel O'Leary. These commitments support the President's efforts to change yesterday's government into one that works better, costs less, and works for the America of today and tomorrow.

We have changed our priorities.

The Department of Energy has changed its priorities so that we contribute to restoring the American Dream. Many changes will be needed for this broad goal and this Agreement is only a beginning. We are working to:

- ☐ Uphold our commitments to science research and technology development.
- ☐ Continue vigilance in the defense of the Nation by maintaining the safety and readiness of our weapons stockpile, safely dismantling weapons, and negotiating nuclear non-proliferation treaties.
- ☐ Clean up of contaminated weapons sites, prevent future pollution, and engage global environmental actions with the same determination that built our nuclear arsenal.
- ☐ Capitalize on emerging markets for sustainable U.S. energy technologies at home and abroad.
- ☐ Achieve an investment-driven economy that creates high-wage jobs and improves the quality of life for Americans.

We have changed how we do business.

To be successful in our business priorities we are implementing the second phase of National Performance Review initiatives and are changing how we do business. We are working to:

- ☐ Change the culture from reactive, command and control approaches to active, preventive solutions in environment, safety and health.
- ☐ Empower our employees, listen to our customers, and re-engineer major work processes.
- ☐ Flatten the bureaucracy, reduce organizational layers, maintain or increase diversity while downsizing, and achieve labor-management partnerships.

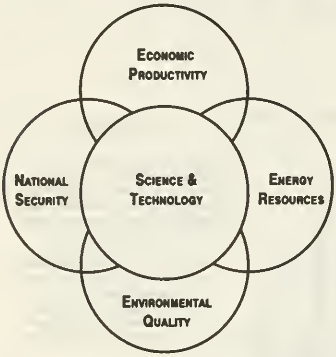
We have been measuring our progress against the commitments in this Agreement since the beginning of the Fiscal Year and are working to improve our measures to be more outcome based. We have a good plan, good people in charge, and are reinventing the Department of Energy with purpose and vigor.

OUR VISION

By the turn of the century, the Department of Energy through its leadership in science and technology will continue to advance U.S. economic, energy, environmental, and national security by being:

- *A major partner in world class science and technology through its national laboratories, research centers, university research, and its educational and information dissemination programs.*
- *A vital contributor to reducing the global nuclear danger through its national security and nonproliferation activities.*
- *A world leader in environmental restoration, waste management, and pollution prevention.*
- *A key contributor in ensuring that the United States leads the world in developing, applying, and exporting sustainable, clean, and economically competitive energy technologies.*
- *A key contributor in maintaining U.S. global competitiveness through leadership in environmentally conscious materials, technologies, and industrial processes.*
- *A safe and rewarding workplace that promotes excellence, nurtures creativity, rewards achievement, and is results-oriented and fun.*

DOE's Goals



To realize our Vision, the Department has established the following **FIVE KEY GOALS:**

☐ ***Leverage DOE's Unique Science and Technology Capabilities to Provide Knowledge that Drives the Nation's Future***

☐ ***Reduce the Global Nuclear Danger***

☐ ***Restore, Stabilize, Protect, and Enhance the Environment***

☐ ***Develop and Deploy Clean Energy Sources and Enhance Energy Security***

☐ ***Stimulate U.S. Economic Productivity***

DOE's Critical Success Factors

To sustain all of our initiatives, the Department has adopted the principles of Total Quality Management to improve customer service and cut costs. Consistent with these principles, DOE will build its reinvention on **FOUR FACTORS** critical to realizing our Vision:

☐ ***Improve Communications and Trust***

☐ ***Increase Productivity of DOE's Human Resources for our new mission***

☐ ***Achieve Excellence in the Safety and Health of DOE Workers, the Public, and the Environment***

☐ ***Become the "Best In Class" in the Use of Management Practices***

DOE'S FY 1995 COMMITMENTS "AT A GLANCE"

GOALS		Page
SCIENCE & TECHNOLOGY **Unleash the Department's deep reservoir of scientific and technological assets and capabilities—40,000 scientists and engineers, including Nobel Prize winners, and a $30 billion laboratory system—to perform world class basic and applied research in commercial and national security arenas, that will advance U.S. security and economic productivity. DOE will continue to support a wide national science and technology portfolio, that spans from the supercomputing initiative with its oil and gas exploration applications, to advanced materials research, with its automotive applications.**	☐ Improving Service Delivery At DOE Science Facilities ☐ Advancing The State-Of-The-Art In High Performance Computing ☐ Investigating The Causes Of Global Climate Change And Reducing Greenhouse Gas Emissions ☐ Educating Young Scientists ☐ Ensuring The Availability Of Isotopes For Health Care ☐ Utilizing New Science For Our Nation's Security ☐ Continuing Peaceful Uses Of The Atom ☐ Diversifying America's Science Workforce ☐ Bringing Science To The Information Infrastructure ☐ Transferring Environmental Technologies	5
NATIONAL SECURITY **Support and maintain a safe, secure, reliable, and smaller nuclear weapons stockpile without underground nuclear testing; dismantle excess weapons; and provide technical leadership for national and global nonproliferation to reduce the continuing and new nuclear dangers in the world.**	☐ Reducing The Weapons Stockpile ☐ Replacing Underground Testing With Science ☐ Maintaining Reliability Of The Future Stockpile ☐ Managing Workforce Restructuring ☐ Leading Worldwide Control Of Weapons Materials ☐ Strengthening Nonproliferation Worldwide ☐ Managing DOE's Fissile Materials ☐ Enhancing the Safety of Soviet-Designed Reactors	7
ENVIRONMENTAL QUALITY **Protect public health and the environment by understanding and reducing the environmental, safety, and health risks and threats from DOE facilities and develop the technologies and institutions required for solving domestic and global environmental problems.**	☐ Understanding The Risks ☐ Reducing The Risks; Cleaning Up Nuclear Weapons Sites ☐ Building Consensus On Waste Treatment ☐ Finding Solutions To Spent Fuel Storage And Funding Issues ☐ Ensuring Environmental Justice ☐ Preventing Future Pollution ☐ Negotiating International Sustainable Development Agreements	9

DOE's FY 1995 COMMITMENTS "AT A GLANCE"

		Page
ENERGY RESOURCES **Develop and deploy energy efficient and renewable energy technologies; advance the efficient and environmentally responsible production, transportation and use of domestic fossil fuels and other conventional energy sources; create sustainable energy technologies with high export potential; promote an equitable system of energy supply and end use; and reduce U.S. vulnerability to energy supply disruptions.**	☐ Transferring Proven Energy Efficiency Measures ☐ Making Federal Facilities More Energy Efficient ☐ Designing The Car Of The Future ☐ Moving Alternative Fuel Vehicles Into The Market Place ☐ Implementing The Energy Policy Act And The Climate Change Action Plan ☐ Implementing International Climate Change Initiatives ☐ Certifying The Next Generation Of Nuclear Powerplants ☐ Moving Clean Coal Technologies Into The Market Place ☐ Generating Electricity From U.S. Agricultural Products ☐ Developing A National Energy Policy Plan ☐ Ensuring Government/Industry Cooperation To Expand National Gas Production ☐ Implementing The Domestic Gas And Oil Initiative	11
ECONOMIC PRODUCTIVITY **Promote sustained U.S. economic growth that stimulates creation of high-wage jobs, diversity in research and development collaborations, efficiency and pollution prevention, and global DOE technology usega and exports.**	☐ Increasing U.S. Energy Technology Exports And Investments ☐ Improving Efficiency In Energy-Intensive Industries ☐ Satisfying Industrial Partners ☐ Leveraging Industrial R&D Investments ☐ Promoting Industrial Use Of DOE R&D Laboratories ☐ Improving Access For Small Businesses	15

DOE's FY 1995 Commitments "At A Glance"

CRITICAL SUCCESS FACTORS		Page
Communication and Trust **Communicate our new post-Cold War mission in an environment of openness, communication, and trust.**	☐ Making More Information Available To The Public ☐ Improving Services To Customers And Stakeholders ☐ Involving Stakeholders In The Policy Making Process	17
Human Resources **Create an environment where teamwork, trust, openness, pride and respect are standard practices, and excellent performance is rewarded. Provide meaningful work opportunities and implement innovative compensation and personnel initiatives to attract and retain a diverse and well-trained workforce, capable of carrying our DOE's new mission.**	☐ Streamlining Management Structure ☐ Assuring Workforce Diversity ☐ Improving Human Resource Practices	19
Environment, Safety, and Health **Continue to shift from a reactive approach to an emphasis on prevention and excellence in protecting worker and public safety and health and in achieving environmental standards. Open the Department's records related to environment, safety and health, and provide stakeholders easy access to this information.**	☐ Implementing Risk-Based Planning And Budgeting ☐ Reducing Serious Vulnerabilities ☐ Decreasing Toxic Releases ☐ Regulating DOE's Nuclear Facilities	20
Management Practices **Adopt "Best In Class" management practices in conjunction with the Department's mission by meeting or exceeding customer expectations by empowering and enabling people to be results-oriented and cost-effective, and by contributing to the Administration's deficit reduction objectives.**	☐ Improving Contractor Accountability And Performance ☐ Setting A New High Standard ☐ Reducing Federal Regulations ☐ Becoming A World Class Quality Organization ☐ Extending Use Of DOE Lands And Facilities ☐ Align The Department To Save Money And Enhance Performance	21

THE DEPARTMENT OF ENERGY'S GOALS

The Department of Energy has a rich heritage of meeting important national goals in the areas of science and technology, economic productivity, energy resources, national security, and environmental quality. The following goals and commitments are our contract with the American taxpayers in FY 1995.

SCIENCE & TECHNOLOGY

Unleash the Department's deep reservoir of scientific and technological assets and capabilities—40,000 scientists and engineers, including Nobel Prize winners, and a $30 billion laboratory system—to perform world class basic and applied research in commercial and national security arenas, that will advance U.S. security and economic productivity. DOE will continue to support a broad national science and technology portfolio, that spans from the supercomputing initiative with its oil and gas exploration applications, to advanced materials research, with its automotive applications.

OUR COMMITMENTS

IMPROVING SERVICE DELIVERY AT DOE SCIENCE FACILITIES

Improve the efficiency of operations and quality of services provided to scientists at the Department's leading-edge basic research facilities. Ensure that facilities are available to users and operated in a reliable and predictable manner that ensures high-quality research products and technology innovations.

☐ *Success will be measured by:*
- *Increasing the ratio of operational time delivered to operational time scheduled for users.*
- *Increasing the amount of advance notice provided to users conducting experiments.*
- *Improving quantitative indicators of technical performance of accelerator facilities.*
- *Improving responsiveness to applications by written acknowledgement within 30 days; review of all proposals by 3 reviewers; and reduced time required for review.*

ADVANCING THE STATE-OF-THE-ART IN HIGH PERFORMANCE COMPUTING

Fully exploit the Department's advanced supercomputing and computational science capabilities to advance the state-of-the-art in high performance computing and support other DOE and national priorities, such as national security, environmental cleanup, and economic productivity.

☐ *Success will be measured by:*
- *Fulfillment of researchers' demand for high performance computing infrastructure facilities.*
- *Surveys of industrial partners on the effectiveness of DOE computational support programs.*
- *Progress in high performance computing applications such as advanced energy supply and demand management, measuring appliance efficiency, and oil and gas recovery.*

INVESTIGATING THE CAUSES OF GLOBAL CLIMATE CHANGE AND REDUCING GREENHOUSE GAS EMISSIONS

Continue to provide strong support to the Interagency effort to investigate the natural and human causes of global climate change phenomena and reduce U.S. greenhouse gas emissions.

☐ *Success will be measured by:*
- *Progress toward the President's goal of reducing greenhouse gas emissions to 1990 levels by the year 2000 and continue the trend of reduced emissions thereafter.*
- *Advances in fundamental knowledge of climactic, geologic, and atmospheric processes affecting global climate change.*

EDUCATING YOUNG SCIENTISTS

Support the Administration's Goals 2000 objective of recapturing U.S. preeminence in science and math education. Make new tools available through access to cutting-edge instructional materials, computerized information such as the Internet, and partnerships with DOE laboratories.

☐ *Success will be measured by providing new instructional tools to 63,000 teachers in 25 urban and rural school districts in FY 1995.*

ENSURING THE AVAILABILITY OF ISOTOPES FOR HEALTH CARE

Produce isotopes in DOE facilities to assure sufficient U.S. supply and to lower costs for cancer therapy and diagnosis. In particular, Molybdenum-99 is an extremely important isotope for which there is no domestic supply. More than 15 million diagnostic medical tests per year rely on this isotope in the U.S. alone.

☐ *Success will be measured by completing the environmental evaluation for establishing a domestic source of Molybdenum-99 in FY 1995.*

UTILIZING NEW SCIENCE FOR OUR NATION'S SECURITY

Initiate in FY 1995 the analysis necessary to decide whether to build the National Ignition Facility as part of a science-based stockpile stewardship program.

☐ *Success will be measured by the start of the Advanced Conceptual Design and National Environmental Policy Act review process while ensuring a stakeholder acceptance of the decision-making process.*

CONTINUING PEACEFUL USES OF THE ATOM

Sign the U.S.-Russia Peaceful Uses of Atomic Energy Agreement to continue cooperative efforts begun in 1973 for energy research, reactor safety, environmental restoration, and nuclear waste disposition.

☐ *Success will be measured by agreeing by June 1995 to extend the agreement for 6 months, and during that period resolve problems inhibiting renewal of the Agreement.*

DIVERSIFYING AMERICA'S SCIENCE WORKFORCE

Increase DOE's support of Historically Black Colleges and Universities (HBCU) to $75 million in FY 1995 from $53 million in FY 1994, to improve institutional infrastructure, support scientific research, and provide equipment as part of the overall support for minority scientists, engineers, and educational institutions.

☐ *Success will be measured by increasing the support of the Historically Black Colleges and Universities and achieving the above-stated goal.*

BRINGING SCIENCE TO THE INFORMATION INFRASTRUCTURE

Upgrade connections to the Internet from 20 DOE advanced research sites to allow remote access by DOE-approved researchers at universities, industries and government agencies. Through the Internet and other communications systems, increase access to DOE scientific and technical information for *all* customer segments.

☐ *Success will be measured by increasing access to, and usage of DOE scientific information by 30 percent from 178,000 customers served in FY 1994.*

TRANSFERRING ENVIRONMENTAL TECHNOLOGIES

Demonstrate new environmental technologies and systems and transfer them to private industry and Federal facilities.

☐ *Success will be measured by:*
- *Demonstrating over 50 new environmental technologies and systems.*
- *Transferring at least 24 environmental technologies to private industry and Federal facilities.*

NATIONAL SECURITY

Support and maintain a safe, secure, reliable, and smaller nuclear weapons stockpile without underground nuclear testing; dismantle excess weapons; and provide technical leadership for national and global nonproliferation to reduce the continuing and new nuclear dangers in the world.

OUR COMMITMENTS

REDUCING THE WEAPONS STOCKPILE

Safely reduce the U.S. Nuclear Weapons Stockpile in order to reduce the nuclear danger and enhance international accord.

☐ *Success will be measured by dismantling 2,000 weapons by the end of September 1995 without adversely impacting the environment, public safety and health.*

REPLACING UNDERGROUND TESTING WITH SCIENCE

Redirect the DOE weapons programs to maintain confidence in the continuing stockpile without underground testing through the science-based Stockpile Stewardship Program.

☐ *Success will be measured by continuing the certification of the safety, security, and reliability of the nuclear weapons stockpile without underground nuclear testing.*

MAINTAINING RELIABILITY OF THE FUTURE STOCKPILE

Select a replacement source for tritium to ensure the U.S. Nuclear Weapons Stockpile remains reliable.

☐ *Success will be measured by obtaining Congressional approval of funding for the new tritium source and by DOE completing technology and site selection through the National Environmental Policy Act review process.*

MANAGING WORKFORCE RESTRUCTURING

Assure fair treatment of workers and communities affected by changing DOE missions.

☐ *Success will be measured by:*
  - *Increasing the proportion of affected workers who transfer, retrain, or retire.*
  - *Increasing the proportion of successful, community-sponsored businesses that are created with the help of DOE economic development initiatives, the number of affected workers they employ, and related community economic benefits.*
  - *Increasing positive assessments of DOE workforce transitions by stakeholders and peer professionals.*

LEADING WORLDWIDE CONTROL OF WEAPONS MATERIALS

Secure nuclear materials and provide expertise in nuclear materials control and accounting in the former Soviet Union. Make transparent and irreversible reduction in nuclear weapons inventories and seek the same from the Russian Federation. Reduce the worldwide civil use and stockpiles of plutonium and highly enriched uranium (HEU).

- ☐ *Success will be measured in 1995 by:*
  - *Increasing the number of projects and facilities engaged in cooperation.*
  - *Continuing reciprocal inspections and monitoring of dismantled components and materials.*
  - *Moving toward the purchase of 500 metric tons of HEU from dismantled warheads resulting in a 25 percent reduction in the worldwide available HEU.*
  - *Reducing the amount of HEU used in research and test reactors in Europe.*
  - *Implementing an agreement with Russia regarding operation of plutonium production reactors.*
  - *Initiating discussions with China on energy technologies.*
  - *Establishing a record of decision on taking back research reactor spent fuel.*

STRENGTHENING NONPROLIFERATION WORLDWIDE

Increase the effectiveness of the International Atomic Energy Agency (IAEA) safeguards and the international nonproliferation regime. Encourage reform in unilateral nuclear export controls, while strengthening Nuclear Suppliers Group effectiveness by promoting expanded information sharing and analysis, and by seeking adherence of non-member key supplier states, e.g., China and South Korea. Promote regional nonproliferation measures such as those underway in South America.

- ☐ *Success will be measured by:*
  - *Obtaining an indefinite extension of the Nuclear Nonproliferation Treaty in April 1995.*
  - *Obtaining signatures of Argentina, Ukraine, and Chile on the Treaty.*
  - *Ensuring that the United States/North Korea Agreed Framework is successfully implemented and that the North Korean nuclear program remains frozen.*
  - *Make progress on concluding a comprehensive test ban treaty.*
  - *Reforming export controls.*
  - *Expanding regional nonproliferation activities into new regions, including the Korean peninsula and South Asia.*
  - *Having the former Soviet Union countries sign an international safeguards agreement.*

MANAGING DOE'S FISSILE MATERIALS

Evaluate the current storage of weapons-usable fissile materials, identify excess materials, expand international inspections, and explore long-term options for storage and disposal of these materials.

- ☐ *Success will be measured by:*
  - *Completing assessments and developing the corrective action plans required to determine safety of the current storage of weapons-usable fissile materials.*
  - *Identifying the materials no longer needed for national security purposes by September 1995.*
  - *Continuing IAEA and bilateral inspections of weapons-usable fissile materials at Oak Ridge, and initiating inspections at Rocky Flats and Hanford, and continuing discussions on future bilateral and international inspections.*
  - *Publishing of options and a draft Programmatic Environmental Impact Statement for long-term storage and disposition of weapons-usable fissile materials by September 1995.*

ENHANCING THE SAFETY OF SOVIET-DESIGNED REACTORS

Increase nuclear safety in countries of Eastern Europe and the Former Soviet Union that operate Soviet-era nuclear power plants.

- ☐ *Success will be measured by:*
  - *Completion of fire safety upgrades at pilot plants in Russia and Ukraine.*
  - *Implementation of emergency operating procedures at a Russian nuclear power plant.*
  - *Delivering additional INPO-recommended operator training courses at training centers in Ukraine and Russia.*
  - *Establishment of a nuclear safety and environmental research center near Chernobyl.*

ENVIRONMENTAL QUALITY

Protect public health and the environment by understanding and reducing the environmental, safety, and health risks and threats from DOE facilities and develop the technologies and institutions required for solving domestic and global environmental problems.

OUR COMMITMENTS

UNDERSTANDING THE RISKS
Identify environmental problems, reduce uncertai ties and prioritize risks throughout the Departmen nationwide complex of facilities.

☐ *Success will be measured by:*
- *Completing characterization of waste stored in 30 Hanford high-level radioactive waste tanks.*
- *Completing the first comprehensive inventory of all DOE high-level radioactive wastes; low-level radioactive, mixed, transuranic, and hazardous wastes; nuclear materials; scrap and chemicals; and excess facilities and land by Spring 1995.*
- *Reporting to Congress by March 1995 the total estimated cost for addressing the environmental problems in the weapons complex and identifying the projects needed to carry out the program.*
- *Reporting to Congress by June 1995 the evaluation of the risk to public health and safety posed by the conditions at the Department's weapons complex facilities that DOE is addressing through compliance agreements for environmental cleanup activities.*

REDUCING THE RISKS; CLEANING UP NUCLEAR WEAPONS SITES
Reduce the environmental, safety and health risks by cleaning up DOE sites.

☐ *Success will be measured by:*
- *Completing over 100 early interim remedial actions and 12 Decontamination and Decommissioning projects in 17 states by September 1995.*
- *Completing the clean up at the Ambrosia Lake, New Mexico by stabilizing, treating, containing, or safely disposing of approximately 2 million cubic yards of soil and tailings in FY 1995.*

BUILDING CONSENSUS ON WASTE TREATMENT

Work with state regulators and EPA regulators, as appropriate, to reach agreement on site treatment plans for management of radioactive and hazardous wastes generated during 50 years of Cold War activities.

☐ *Success will be measured by reaching agreement on all 48 proposed site treatment plans by September 1995.*

FINDING SOLUTIONS TO SPENT FUEL STORAGE AND FUNDING ISSUES

Initiate and coordinate administrative proposals to address interim spent fuel storage and its funding of spent fuel from commercial nuclear reactors.

☐ *Success will be measured by:*
- *Submitting to Congress in FY 1995 a proposal to address interim spent fuel storage.*
- *Transmitting to Congress a proposal to use funds from the sale of the United States Enrichment Corporation for the program to manage spent fuel from commercial reactors.*

ENSURING ENVIRONMENTAL JUSTICE

Implement the Environmental Justice Executive Order, identify departmental activities that disproportionately affect human health and the environment and provide improved means for participation of low-income and minority communities.

☐ *Success will be measured by:*
- *Providing the Department's Environmental Justice strategy to an Interagency Working Group by February 1995.*
- *Establishing an information clearinghouse about Department activities and resources used to reduce or prevent adverse health or environmental impacts.*
- *Prioritizing proposed projects.*
- *Developing implementation plans for approved projects.*
- *Co-sponsoring and contributing data and perspective to a National Academy of Sciences, Institute of Medicine study on Environmental Justice.*

PREVENTING FUTURE POLLUTION

Initiate pollution prevention programs that will avoid future waste management costs and therefore pay for themselves.

☐ *Success will be measured by initiating 17 DOE-wide "Return on Investment" programs for pollution prevention that pay for themselves within 3 years.*

NEGOTIATING INTERNATIONAL SUSTAINABLE DEVELOPMENT AGREEMENTS

Further developing institutions required for solving global environmental problems.

☐ *Success will be measured by having U.S. proposals adopted in United Nations organizations on climate change, stratospheric ozone, sustainable development, shipment and disposal of hazardous wastes, and long range transport of air pollution.*

ENERGY RESOURCES

Develop and deploy energy efficient and renewable energy technologies; advance the efficient and environmentally responsible production, transportation, and use of domestic fossil fuels and other conventional energy sources; promote development of sustainable energy technologies with high export potential; promote an equitable system of energy supply and end use; and reduce U.S. vulnerability to energy supply disruptions.

OUR COMMITMENTS

TRANSFERRING PROVEN ENERGY EFFICIENCY MEASURES

Save low-income residents, schools and hospitals the equivalent of 900,000 barrels of oil and reduce their annual energy costs by over $28 million.

☐ *Success will be measured by weatherizing 115,000 low-income homes and upgrading 1,350 schools and hospitals by September 1995.*

MAKING FEDERAL FACILITIES MORE ENERGY EFFICIENT

Transfer the appropriate technologies used in "Greening of the White House" to all Federal buildings to support reduction of federal energy consumption by 30 percent by 2005.

☐ *Success will be measured by:*
  - *Initiating three new Federal "Greening Models," the Pentagon, the Presidio, and the Forrestal.*
  - *Doubling energy service contracts.*
  - *Increasing private energy contractor investments by $20 million.*

DESIGNING THE CAR OF THE FUTURE

Lead the design and research for an 80 miles per gallon car of the future. Demonstrate a prototype by the year 2004.

☐ *Success will be measured by:*
  - *Completing in FY 1995 the industry engineering design team for the "Partnership for a New Generation Vehicle" Team.*
  - *Completing the industry-government research and development plan, beginning the work.*
  - *Forming the Fuel Cell Alliance to involve small businesses and universities in developing lower cost fuel cells for transportation.*

MOVING ALTERNATIVE FUEL VEHICLES INTO THE MARKET PLACE

Displace 14 million gallons of gasoline, by introducing new alternative fuel vehicles in a clean city.

☐ *Success will be measured by the addition of 25,000 alternative fuel vehicles to Federal and local fleets and 70 refueling sites in Clean Cities by September 1995.*

IMPLEMENTING THE ENERGY POLICY ACT AND THE CLIMATE CHANGE ACTION PLAN

Launch the President's Climate Change Action Plan which, by the year 2000, will reduce carbon emissions by 25 million metric tons, produce $20 billion in energy savings, create and sustain more than 100,000 jobs, and stimulate $25 billion in industrial investment.

☐ *Success will be measured by initiating 12 of the DOE sponsored actions that will add 1,000 voluntary business, industry and government partners including:*
- *5 new appliance collaboratives.*
- *25 new industry commitments to Climate Wise for voluntary industrial greenhouse gas reductions.*
- *25 new Motor Challenge agreements to optimize electric system efficiencies.*
- *50 new state and local building retrofit programs.*
- *Support for 800 partnerships with utilities committed to the Climate Challenge voluntary utility emissions reduction initiative.*

IMPLEMENTING INTERNATIONAL CLIMATE CHANGE INITIATIVES

Monitor and mitigate greenhouse gas emissions.

☐ *Success will be measured by:*
- *Completing the development of guidelines and establishing the data collection system for voluntary reporting on greenhouse gases emitted in the U.S.*
- *Obtaining federal interagency approval of the first greenhouse gas reduction submissions under the U.S. Initiative on Joint Implementation to further U.S. goals under the Climate Change Treaty.*

CERTIFYING THE NEXT GENERATION OF NUCLEAR POWERPLANTS

Complete the testing and other activities necessary to receive Nuclear Regulatory Commission certification of the next generation of light water reactors which will be simpler, safer and less expensive to build and operate than current plants.

☐ *Success will be measured by the Nuclear Regulatory Commission's publication in the Federal Register of the certification rule for two evolutionary plants by the end of FY 1995.*

MOVING CLEAN COAL TECHNOLOGIES INTO THE MARKET PLACE

Complete operations for 10 of 43 Clean Coal Technology projects in partnerships with industry, bringing to 21 the total number of projects with operations completed.

☐ *Success will be measured by successfully completing these clean coal projects and increasing commercial applications in FY 1995 and beyond.*

GENERATING ELECTRICITY FROM U.S. AGRICULTURAL PRODUCTS

Establish the basis for an integrated Biomass Power Industry that uses abundant local crops as primary energy sources. The five initial demonstrations will provide 40 MWe to the electrical grid in 1998, stimulate an additional 200 MWe through replication, and displace 0.5 million tons of carbon by the year 2000.

☐ *Success will measured by:*
- *Completing eight different feedstock case studies.*
- *Attracting five partners and $18 million in private sector cost share.*
- *Initiating four advanced technology pilot-scale biomass powerplant projects.*

DEVELOPING A NATIONAL ENERGY POLICY PLAN

Lead an interagency effort to develop with public participation the Administration's long-term energy policy plan.

☐ *Success will measured by transmitting to Congress a coherent long-term policy framework by the end of FY 1995 that addresses sustainability issues and provides a basis for aligning budget priorities starting in FY 1997.*

ENSURING GOVERNMENT/INDUSTRY COOPERATION TO EXPAND NATURAL GAS PRODUCTION

Ensure cooperation within government and between government and industry through joint strategic planning, and implementation of RD&D and deployment of advanced technologies to expand natural gas production and utilization to meet the Nation's environmental and energy efficiency needs.

- ☐ *Success will be measured in FY 1995 by completion, in cooperation with industry and other governmental agencies, of a natural gas strategic and multi-year plan focusing all Departmental gas activities on the highest priority goals and objectives, and by implementing a Memorandum of Understanding with the Gas Research Institute to develop cooperative projects, including initiation of 12 projects leveraging funding of $20 million by the end of FY 1995.*

IMPLEMENTING THE DOMESTIC GAS AND OIL INITIATIVE

Implement the Domestic Natural Gas and Oil Initiative to increase gas and oil production an average of 450,000 barrels per day (oil equivalent) during the 2001-2010 period.

- ☐ *Success will be measured by:*
  - *Transferring National Laboratory advances in computational technology to the private sector to accelerate analysis of oil and gas exploration and production potential.*
  - *Beginning the third round of advanced oil technology demonstration projects.*
  - *Completing an interagency study of impacts on the U.S. from the rising level of oil imports*
  - *Establishing a partnership with industry to design the refinery of the future with technologies that meet new environmental standards.*
  - *Forming partnerships with States, other Federal agencies, industry and others to simplify regulations that affect gas and oil supply without compromising environmental protection.*

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ECONOMIC PRODUCTIVITY

Promote sustained U.S. economic growth that stimulates creation of high-wage jobs, diversity in research and development collaborations, efficiency and pollution prevention, and global DOE technology usage and exports.

OUR COMMITMENTS

INCREASING U.S. ENERGY TECHNOLOGY EXPORTS AND INVESTMENTS

Stimulate sales of U.S. energy technology and capital investments in countries with large, emerging markets in cooperation with the Departments of Commerce and State.

☐ *Success will be measured by signing private sector agreements with a value of over $20 billion during Presidential/Secretarial Missions on Energy Trade, Investment and Sustainable Development to: India, Pakistan, the African continent, Russia, Brazil, and China.*

IMPROVING EFFICIENCY IN ENERGY-INTENSIVE INDUSTRIES

Develop partnerships with energy-intensive industries such as refining, pulp and paper, and metals, to develop research programs, strategies and technologies that will lead to dramatically improved energy and resource efficiency and competitiveness by the year 2000 and beyond.

☐ *Success will be measured by establishing partnerships in four industries by September 1995 with performance goals and measures for energy and materials saved, pollution prevented, and productivity increased, relative to FY 1994 performance results.*

SATISFYING INDUSTRIAL PARTNERS

Increase industry's satisfaction with our partnerships.

☐ *Success will be measured by partners' responses to an annual survey done in FY 1995 wherein 80 percent of our private sector partners indicate they are satisfied or better with the general value and service received from DOE collaborations.*

LEVERAGING INDUSTRIAL R&D INVESTMENTS

Increase the Department's R&D laboratory budget for cost-shared partnerships with industry.

☐ *Success will be measured by a 20 percent increase in the laboratory R&D budget leveraged with industry in FY 1995 compared with FY 1994.*

PROMOTING INDUSTRIAL USE OF DOE R&D LABORATORIES

Eliminate or improve selected provisions and procedures in DOE Orders to reduce the contract processing time required for DOE laboratories and facilities to enter into agreements to perform work for industry.

- ☐ *Success will be measured by reducing the time for processing contracts in FY 1995 by 25 percent of the FY 1994 baseline.*

IMPROVING ACCESS FOR SMALL BUSINESSES

Increase small business use by DOE laboratories, facilities, field organizations, and headquarters in FY 1995.

- ☐ *Success will be measured by increasing the small businesses contracting from 25 percent in FY 1994 to more than 34 percent by the end of FY 1995.*

DOE'S CRITICAL SUCCESS FACTORS

The Department has adopted Total Quality Management principles to drive our National Performance Review Initiatives to improve overall effectiveness and reduce costs. We will meet or exceed customer requirements and make DOE a professional and personally rewarding place to work. DOE has focused on **FOUR FACTORS** critical to successfully realizing the Department's mission:

COMMUNICATION AND TRUST

Communicate our new post-Cold War missions in an environment of openness, communication, and trust.

OUR COMMITMENTS

MAKING MORE INFORMATION AVAILABLE TO THE PUBLIC

Declassify more existing information, reduce the volume of new information and documents classified, and provide to millions of Internet subscribers worldwide an instant directory of previously classified material.

☐ *Success will be measured by:*
- *Classifying 20 percent fewer documents and declassifying 20 percent more information and documents than during FY 1994.*
- *Continuing "Opennet," an on-line Internet bibliography of declassified DOE documents launched in FY 1994.*
- *Identifying and setting priorities for declassification of the estimated 15 million classified documents in DOE's inventory by February 1995.*

IMPROVING SERVICES TO CUSTOMERS AND STAKEHOLDERS

Develop techniques to improve delivery of services and products to customers and stakeholders.

☐ *Success will be measured by:*
- *Eliminating the pre-1990's backlog of headquarters Freedom of Information Act (FOIA) requests by January 1995.*
- *Completing a second national survey of DOE stakeholders' attitudes, needs, and expectations of DOE by July 1995 to establish a baseline by which to measure future progress.*
- *Implementing by July 1995 the Whistleblower Initiative, which encourages DOE employees to identify Federal government waste, abuse and fraud while providing protection from reprisals.*

INVOLVING STAKEHOLDERS IN THE POLICY MAKING PROCESS

Assure that the business of DOE will be open to the full view and input of those whom it serves, consistent with applicable laws, regulations, and contracts.

☐ ***Success will be measured by:***

- ***Establishing a public involvement performance measurement for managers in FY 1995.***
- ***Establishing Site-Specific Advisory Boards at the Department's field sites.***

HUMAN RESOURCES

Create an environment where teamwork, trust, openness, pride and respect are standard practices, and excellent performance is rewarded. Provide meaningful work opportunities and implement innovative compensation and personnel initiatives to attract and retain a diverse and well-trained workforce, capable of carrying out DOE's new mission.

OUR COMMITMENTS

STREAMLINING MANAGEMENT STRUCTURE

Reduce management layers and encourage employee empowerment. Align staffing and associated budget allocations with the Department's Strategic Planning process.

☐ *Success will be measured by:*
- *Increasing the supervisor-to-worker ratio to 1:10 by September 1995, from a 1993 baseline of 1:4.*
- *Completing a comprehensive reexamination of the organizational structure and staffing within the Department.*
- *Completing by September 1995, the process of aligning staffing and associated budget allocations with the Department's Strategic Planning.*

ASSURING WORKFORCE DIVERSITY

Recruit, hire and retain a diverse workforce and assure that DOE contractors achieve diversity.

☐ *Success will be measured by:*
- *Developing strategies to improve diversity in the Department's workforce.*
- *Developing criteria to select and reward contractors based on demonstrated improvement in achieving diversity.*

IMPROVING HUMAN RESOURCE PRACTICES

Develop techniques for assuring management success in achieving performance goals critical to realizing the Department's mission.

☐ *Success will be measured in FY 1995 by:*
- *Revising senior managers' performance evaluation criteria to measure their effectiveness in: communications and trust; human resource management; environment, safety, and health; and management practices.*
- *Establishing labor-management partnerships with Federal employee unions that improve organizational effectiveness and customer service.*
- *Revising employee pay and classification systems to improve the Department's performance in recruiting, retaining, and rewarding technical excellence in the workplace.*
- *Streamlining personnel systems by reducing administrative processing timeframes, providing improved customer service, and increasing the use of automation.*

ENVIRONMENT, SAFETY, AND HEALTH

Continue to shift from a reactive approach to an emphasis on prevention and excellence in protecting worker and public safety and health and in achieving environmental standards. Open the Department's records related to environment, safety and health and provide stakeholders easy access to this information.

OUR COMMITMENTS

IMPLEMENTING RISK-BASED PLANNING AND BUDGETING

By September 1995 implement a risk-based environment, safety and health planning and budgeting process.

☐ *Success will be measured by completing (80 percent was completed in FY 1994) the identification of the highest priority environment, safety and health needs, and put in place a process to ensure they are funded and tracked.*

REDUCING SERIOUS VULNERABILITIES

By May 1995 complete Plutonium and Chemical Vulnerability Studies and associated corrective action plans.

☐ *Success will be measured by reducing the number of unaddressed serious vulnerabilities at DOE facilities from several dozen to zero.*

DECREASING TOXIC RELEASES

Reduce the Department's total toxic chemical releases each year.

☐ *Success will be measured by achieving a reduction of about 7 percent or 50 tons in the toxic chemical release for 1994.*

REGULATING DOE'S NUCLEAR FACILITIES

Assist the new Federal Advisory Committee that is developing recommendations for regulation of DOE nuclear facility safety.

☐ *Success will be measured by the Committee's recognition that DOE has provided timely information and analysis to the Advisory Committee that results in a credible approach to safety regulation at DOE's nuclear facilities.*

MANAGEMENT PRACTICES

Adopt "Best in Class" management practices in conjunction with the Department's mission by meeting or exceeding customer expectations by empowering and enabling people to be results-oriented and cost-effective, and by contributing to the Administration's deficit reduction objectives.

OUR COMMITMENTS

IMPROVING CONTRACTOR ACCOUNTABILITY AND PERFORMANCE

The Department will launch shared cost savings incentives, and will stimulate competition through selection criteria. DOE will encourage management and operating contractors to focus on managing and integrating site activities, rather than performing all site operations. These reforms will affect over $40 billion of contracted services during a 5-year period.

☐ *Success will be measured by completing all actions in DOE's document "Making Contracting Work Better and Cost Less," and completing the following specific actions:*
- *Launching a DOE-wide incentive program to incorporate cost avoidance and reduction into contractor programs (January 1995).*
- *Initiating performance-based management contracts with performance measures tailored to specific contract activities (January 1995).*
- *Identifying discrete tasks for reform in existing contracts and subcontracts (March 1995).*
- *Compensating contractors based on evaluations against objective performance criterio and measures (July 1995).*

SETTING A NEW HIGH STANDARD

Establish a new legacy of improved contracting through the Department's completion of negotiations with seven of the largest contractors.

☐ *Success will be measured by incorporating the contract reforms for the following seven largest contracts by the end of in FY 1995:*
- *Hanford Reservation (March 1995).*
- *West Valley Demonstration Project (January 1995).*
- *Waste Isolation Pilot Project (January 1995).*
- *Argonne National Laboratory (March 1995).*
- *Brookhaven National Laboratory (March 1995).*
- *Continuous Electron Beam Accelerator Facility (March 1995).*
- *Rocky Flats Site (September 1995).*

REDUCING FEDERAL REGULATIONS

Achieve a 50 percent reduction of Departmental Orders from 312 to 156 in FY 1995. By July 1995, DOE will inventory reporting and documentation required by other categories of internal DOE regulations and eliminate 10 percent of these requirements to further reduce and avoid costs.

☐ *Success will be measured by tracking the elimination of prescriptive requirements as well as nonessential processes, reports, forms, and directives, resulting in a projected $100 million of avoided costs.*

BECOMING A WORLD CLASS QUALITY ORGANIZATION

Conduct internal self-assessment of DOE's management practices by September 1995 to begin measuring and evaluating progress toward the goal of becoming a world class quality organization. DOE will actively pursue and achieve the standards contained in the President's Award for Quality criteria and progressively demonstrate a "well-planned, sound, and systematic approach" to quality management in many parts of the Department.

☐ *Success will be measured by conducting a full baseline assessment to be completed by September 1995.*

EXTENDING USE OF DOE LANDS AND FACILITIES

Issue a new policy by July 1995 to directly involve stakeholders in the consideration of alternatives for the best use of Department lands and facilities.

☐ *Success will be measured by announcing in conjunction with stakeholders at least six major actions to make land and facilities available for broader public use by the end of FY 1995.*

ALIGN THE DEPARTMENT TO SAVE MONEY AND ENHANCE PERFORMANCE

Initiate a major organizational restructuring that saves money and enhances government performance, beginning in FY 1995.

☐ *Success will be measured in FY 1995 by:*

- *Announcing the Secretary's decisions on the Strategic Alignment Initiative.*
- *Developing an implementation plan.*
- *Submitting legislation to implement Administration policy on the Power Marketing Administrations.*
- *Submitting legislation to privatize the Naval Petroleum Reserves.*
- *Submitting legislation to detach the Federal Energy Regulatory Commission from the Department.*

Measurement and Monitoring of Performance

To maintain focus, a sense of urgency, and to have a real impact on performance, there will be periodic reviews of progress, discussion of difficulties encountered, and agreement on appropriate actions. These reviews will be held between the President and/or his designees and Department officials and, with greater frequency within the Department. Any specific reporting requirements will be developed jointly with the Department.

Administration Support

In order to accomplish the goals herein described, it is the Administration's objective to:

☐ Provide visible, high profile support for:
  - the Department's National Security programs, including a new source of tritium for the U.S. nuclear weapons stockpile,
  - control and nonproliferation of fissile materials and the international inspection of excess fissile materials by the International Atomic Energy Agency, and
  - the Presidential Initiatives, including the Department's Climate Change Program, the Alternative Fueled Vehicle Program, and the partnership for a new generation of vehicles.
  - review of the Department's Fusion Program by the President's Council of Advisors on Science and Technology by July 1995. This review will inform the Administration's decision on U.S. participation with Russia, Japan, and the European Union in the construction of the International Thermonuclear Experimental Reactor.

☐ Submit legislation for consideration during the 104th Congress that would allow funds from the sale of the United States Enrichment Corporation to be used for the civilian radioactive waste management program.

Miscellaneous

This agreement is intended only to improve the internal management of the Executive Branch and is not intended to and does not create any right, benefit, trust or responsibility, substantive or procedural, enforceable by law or equity by any party against the United States, its agencies, its officers, or any person.

Term of Agreement

This agreement will remain in effect until modified. It is expected that it will be updated at least annually to reflect significant changes in budget, policy, personnel, or other factors that may affect the accomplishment of objectives.

This agreement represents our joint commitment to a Department of Energy that works better, costs less, and fulfills our sacred trust to the American People.

Hazel R O'Leary

Hazel R. O'Leary
Secretary of Energy

William J. Clinton

William J. Clinton
President of the United States

Secretarial Officers' Concurrence

We concur with the commitments made in this agreement with the President, and further agree to fulfill our individual responsibilities.

B H White
WILLIAM H. WHITE
Deputy Secretary

Susan F. Tierney
SUSAN F. TIERNEY
Assistant Secretary
Policy

Tara O'Toole
TARA J. O'TOOLE
Assistant Secretary
Environmental Safety & Health

ARCHER L. DURHAM
Assistant Secretary
Human Resources & Administration

Carolyn H Watts
CAROLYN HEBR WATTS
Acting Assistant Secretary
Congressional, Intergovernmental & International Affairs

Joseph F. Vivona
JOSEPH F. VIVONA
Chief Financial Officer

Martha A. Krebs
MARTHA A. KREBS
Director
Energy Research

Terry Cornwell Rumsey
TERRY CORNWELL RUMSEY
Director
Science Education & Technical Information

Corlis S. Moody
CORLIS S. MOODY
Director
Economic Impact & Diversity

Jay E. Hakes
JAY E. HAKES
Administrator
Energy Information Administration

Al - MacLachlan
ALEXANDER MACLACHLAN
Deputy UnderSecretary
Technology Partnerships & Economic Competitiveness

Charles B. Curtis
CHARLES B. CURTIS
Under Secretary

Thomas P. Grumbly
THOMAS P. GRUMBLY
Assistant Secretary
Environmental Management

VICTOR H. REIS
Assistant Secretary
Defense Programs

Christine Ervin
CHRISTINE A. ERVIN
Assistant Secretary
Energy Efficiency & Renewable Energy

Patricia Fry Godley
PATRICIA FRY GODLEY
Assistant Secretary
Fossil Energy

ROBERT R. NORDHAUS
General Counsel

Kenneth E. Baker
KENNETH E. BAKER
Acting Director
Nonproliferation & National Security

L Barrett for
DANIEL A. DREYFUS
Director
Civilian Radioactive Waste Management

Terry R. Lash
TERRY R. LASH
Director
Nuclear Energy, Science and Technology

for Anna Pruitt
MICHAEL GAULDIN
Director
Public & Consumer Affairs

D W Pearman
DONALD W. PEARMAN, JR.
Associate Deputy Secretary
Field Management

Mr. SCHIFF. Thank you, Mr. Chupka.

Dr. Hebner, please.

STATEMENT OF DR. ROBERT HEBNER, ACTING DEPUTY DIRECTOR, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Dr. HEBNER. Thank you, Mr. Chairman, and Members of the Committee.

I am pleased to report to you today on NIST activities toward the implementation of the Government Performance and Results Act.

The mission of the National Institute of Standards and Technology—that is, NIST—is to promote U.S. economic growth by working with industry to develop and apply technology, measurements, and standards. We do this by running four major programs.

The first is our laboratory-based program that has as its objective to assure that there is an adequate base of measurements and standards so that within the United States and around the world, U.S. products can be manufactured, bought, and sold.

We have the Advanced Technology Program in which we are partnering with industry to develop the technology base so that the advances in science can lead to the manufacturing of products in the United States.

We run the Manufacturing Extension Partnership Program by which we are partnered primarily with the States to assure that the benefits of advancing technology are available to the small- and medium-sized manufacturers.

And we run the Malcolm Baldrige Quality Award—or we run a quality program, the flagship part of which is the Malcolm Baldrige Quality Award.

In running these programs we have over the years and decades that we have been doing it developed, and continue to develop, a management program. Our management program requires that we do have a strategic plan. Because we are technology intensive, we have to assess the scientific and technological progress which is occurring in this country and around the world.

Because we are working with industry, we have to understand what the industry's plans and expectations are; and we use the results of our previous assessments to make an informed judgment to set the priorities for our technical programs from which we develop a portfolio of projects.

This portfolio of projects is expected to have an impact on the U.S. economy in a time frame maybe as short as a year, but typically significantly longer, maybe as long as 10 to 15 years. So we also need intermediate ways of assuring the quality and assuring that these stay on track.

We do review the outputs from these projects. We look at the papers, the talks, the standards, all of the countable things that one can look at to assure quality.

In addition, we are obsessive about making sure that we have outside peer review. We do contract with the National Research Council to conduct an outside independent review of our programs.

We have the Visiting Committee on Advanced Technology which meets quarterly to review our programs.

In addition, we expect—since our objective is to have an impact on the economy, we do formal economic impact studies of our work when it is completed and use those to tell us what works, what does not work, and why.

So from this description of what we are doing, even though the Government Performance and Results Act was not tailor-made for what we are doing, for an off-the-rack program it fits us fairly well and we are very comfortable with it.

Thank you.

[The prepared statement of Dr. Hebner follows:]

Statement of
Dr. Robert E. Hebner
Acting Deputy Director
National Institute of Standards and Technology

Before the

Committee on Science
U.S. House of Representatives
on
Civilian Science Agencies' Implementation
of the
Government Performance and Results Act

July 10, 1996

Mr. Chairman and members of the Committee:

I am Robert E. Hebner, Acting Deputy Director of the National Institute of Standards and Technology (NIST). I am pleased to appear before you today to review the status of the progress and plans that NIST has made toward the implementation of the Government Performance and Results Act.

As part of the Commerce Department's Technology Administration, NIST has a **primary mission** to promote U.S. economic growth by working with industry to develop and apply technology, measurements, and standards -- providing the basic technical infrastructure needed by industry to transform technology into the profits and jobs that yield the true returns to the American taxpayers.

NIST's programs are guided by four principles:

- NIST focuses on critical jobs vital to the country's technology infrastructure that neither industry nor the government can do separately. These are the jobs that private companies cannot or will not take on by themselves -- either because they cannot capture the broad-based benefits that will accrue to the economy at large, or because the tasks are long-term and carry high risks and, therefore, fall outside what industry can do alone.
- Industry drives NIST's priorities and plays a critical role in helping the Institute to carry out its work.
- Rigorous, open, technically sound and competitive processes are the hallmark of all of NIST's efforts. All of the Institute's programs are strictly merit-based.
- NIST relies heavily on evaluation of its work to ensure that industry and the taxpayers are receiving the greatest possible return on their investment.

NIST carries out its mission and goals through four major programs:

- The NIST laboratory program assures that the U.S. has the measurement capability that industry needs to continually improve its products and services--by conducting research, providing services, and providing the infrastructural technologies, such as measurements, standards, reference materials, evaluated data, and test methods.
- The Advanced Technology Program promotes development of high-risk , preproduct, enabling technologies through cost-shared, competitive awards to industry.
- The Manufacturing Extension Partnership helps smaller manufacturers improve their competitiveness through a nationwide network of extension centers and experts, co-funded by states and local governments, that provides hands-on technical assistance.
- The Baldrige National Quality Program, which manages the Malcolm Baldrige National Quality Award, recognizes and promotes quality improvements and practices for U.S. industry.

Setting Priorities and Measuring Results at NIST

NIST has a long tradition of over nine decades of partnership with U.S. industry, its principal customer. In this partnership, priorities are set and results are measured on the basis of benefits realized by U.S. industry. Indeed, a Council on Competitiveness report, "Industry as a Customer of the Federal Laboratories" (Washington D.C. 1992) describes the NIST laboratories' process of working cooperatively with industry as "the most streamlined of all and is perhaps the best model for other federal labs to follow....NIST is very flexible and able to respond quickly to industry's inquiries without bureaucratic interference." This traditional operational culture is the base upon which NIST will fit the GPRA framework.

The newer programs in NIST's portfolio, ATP, MEP, and Quality, were created in the context of this tradition of priority setting and evaluation. For instance, during the pilot phase of the ATP, NIST held general competitions for funding open to all areas of technology with all project ideas coming straight from industry. Candidate projects were evaluated on the basis of scientific and technical merit, potential broad-based economic impacts, plans for eventual commercialization of the research, the experience and qualifications of the proposer, and the evidence of the level of commitment to the project. From its start, the ATP has emphasized detailed evaluation as critical to an effective, results-oriented program. The ATP examines both the operational performance of its program and tracks the short-term and intermediate project results. The long-term economic impacts which will occur as the program matures will also be measured.

NIST uses a variety of tools to identify industry's high-priority technology needs, including convening conferences and workshops. Industry input helps to set the direction and emphasis of NIST programs, and it encourages industries and individual companies to shape and participate in new initiatives. One result of this process is high levels of industrial participation in NIST programs; another is solid agreement on technical objectives.

NIST laboratories set their priorities in accordance with these criteria:

- the magnitude and immediacy of industrial need;
- the degree of correspondence between a particular industrial need and NIST's mission to develop infrastructural technologies;
- the opportunity for NIST participation to make a difference;
- the nature and size of the anticipated impact resulting from NIST's participation;
- NIST's capability to respond in a timely fashion with a high-quality solution; and,
- the nature of opportunities afforded by recent advances in science and technology.

NIST seeks and relies on industry input on the direction and content of its program at several levels of organization. For example, the Visiting Committee on Advanced Technology, an advisory board which traces its origins to the founding of the agency in 1901, is composed largely of industry representatives, and meets quarterly to review the policies, budget, organization, and programs of the Institute. In addition each of NIST's eight intramural laboratories undergoes annual performance assessments by independent panels of experts from industry and academia, convened by the National Research Council.

NIST programs are guided by measurement and evaluation systems that the agency uses as it sets priorities, evaluates operational performance, and assesses near- and long-term returns on agency investments and activities. NIST recognizes that systems and mechanisms for setting priorities, evaluating performance, and measuring impacts must be continually strengthened and improved, paving the way for improvements in the quality and content of programs and services. There is little precedent in the federal government and in the private sector when it comes to measure the results of technology investments. Because returns on R&D typically do not begin to accrue until several years after research is completed and the diffusion of expected benefits will impact broad sectors of the economy, assessment of economic impact is by its very nature a long-term endeavor. Economic effects can be projected but never known with certainty in advance. Thus, NIST must select priorities carefully and rely on measures of performance and short- and intermediate-term results as it decides where and how it invests its resources.

NIST gathers information on the primary "products"--measurements, standards, databases, process models, and the other types of deliverables--produced by its laboratory program. These deliverables usually take the form of technical data that are made widely available to U.S. industry. Measures of the relevance and value of this information to industry include:

- industry attendance, comments, and level of participation at technical workshops;
- number of inquiries and requests for information;
- attendance at technical training sessions provided by NIST personnel;
- commercialization of products incorporating the results of NIST R&D; and,
- application of NIST R&D results to industrial processes.

Other short- and medium-term measures are also used to assess industrial relevance, performance, and productivity of laboratory activities.

NIST initiated a series of periodic assessments of the economic impacts of NIST laboratory research in the early 1980s. Conducted by independent researchers under contract to NIST, these third party assessments have estimated the aggregate rates of return (also referred to as social rates of return) on work addressing infrastructural needs of industry. Returns on NIST work in the 12 technology areas evaluated so far ranged from 41 to 428 percent with a median rate-of-return of 147 percent. These rates of return are very favorable relative to private sector and other government research programs. This long-term measure of economic impact broadly emphasizes the large impact of developing measurement methods and other infrastructural technologies.

I have summarized these past and ongoing NIST activities to put the more recent GPRA activities in an appropriate perspective. The document "Setting Priorities and Measuring Results at the National Institute of Standards and Technology" (NIST, January 1994, 38 pg) provides further detail on this subject.

Progress towards NIST implementation of GPRA

Strategic planning activities are now underway at several levels for NIST that are expected to meet the requirements of GPRA. These include the ongoing strategic planning activities of the NIST laboratories and initiation of strategic planning by the other NIST programs. In addition, the NIST Executive Board has scheduled an update of the broader NIST strategic plan, which encompasses the activities of each of the NIST programs. And, NIST is participating in the development of an overarching strategic plan of the Department of Commerce. The Commerce planning effort has been brought into focus as a result of an OMB memorandum of

April 11, 1996, requiring that every federal agency provide three key elements of their strategic plans to OMB by June 7, 1996. These three elements are mission statement, goals and objectives, and ties between those goals and objectives and annual plans/performance measures.

NIST currently plans to implement GPRA at the level of each of its four major programs described above. The strategic planning efforts underway in each of the programs are directed toward the September 30, 1997, requirement in Section 306 of the Government Performance and Results Act of 1993. In the case of the NIST Laboratory program, a Laboratory Council, comprising the Directors of the NIST laboratories, has been established and is well along in developing a Laboratories Strategic Plan that provides guidance for encompasses the separate strategic plans of each of the individual laboratories. Draft strategic plans are now in place and under discussion for the other NIST programs.

NIST has been regularly participating in an ad hoc interagency discussion group that has been addressing the issues of applying the GPRA to organizations doing applied and basic research as their mission. This "Performance Measures and Research Round Table" held its 16th and most recent meeting June 18, 1996. The participants of the Round Table have shared their experiences with the development of strategic plans and performance measures. Participants include NIH, FDA, HHS, EPA, USDA, Army, DOE, DOI, NSF, as well as a number of other federal organizations. Guest speakers from OMB and OSTP have provided their insights at these meetings. NIST hosted the 15th meeting of this Round Table and presented its GPRA-related activities. The Round Table produced a whitepaper in August 1995 that expounds a performance measurement model for research. This model proposes that the dimensions of performance for research--relevance, productivity, and quality--can be assessed to differing extents by three methods--peer review, metrics, and customer evaluation.

Consulting with customers in developing strategic goals
All of NIST's programs involve extensive interactions with their customers and stakeholders, which include U.S. industry and government, universities, the technical and scientific communities, and foreign counterpart laboratories. These interactions take place through a myriad of avenues, including everything from sales of standard reference materials and calibration services, distribution of criteria for achieving customer focus and performance excellence by the Quality Program, interactions of technical staff with their colleagues at national and international conferences, solicitation of program white papers by the Advanced Technology Program and numerous workshops, to participation by staff in trade and professional associations and on standards committees, and numerous visits by staff at all levels to industrial sites.

NIST uses review panels to assess and advise its programs at all levels. Its statutory advisory committee, the Visiting Committee on Advanced Technology (VCAT), reviews NIST's programs and operations on a quarterly basis, including NIST's customer and stakeholder interactions. In the past year, the VCAT has discussed with the Laboratory Council its strategic planning activities, and reviewed the vision, values, mission and goals that the Laboratory

Council articulated for the laboratories. The Laboratories are rigorously assessed each year by the National Research Council's Board of Assessment of NIST Programs. The summary of this assessment process is also presented to the VCAT for their consideration. The Baldrige National Quality Program has a Board of Overseers consisting of distinguished leaders from all sectors of the U.S. economy, who evaluate all aspects of the program, including the adequacy of the criteria and processes for making awards. The VCAT has advised that the ATP and MEP programs develop a third party process of outside scrutiny. Although the VCAT considered undertaking this expanded role for themselves, they concluded that the process could best be accomplished by independent reviewers similar to the National Research Council's review of the NIST laboratories. This recommendation is now being actively pursued and we recognize that these review panels will provide a valuable resource for evaluation of these programs.

The NIST mission and strategic plans have and will continue to be developed in consultation with the customers and stakeholders identified above. The Visiting Committee on Advanced Technology has and will continue to work with the NIST programs to refine and focus this mission and planning.

Establishing strategic goals and appropriate performance measures for R&D, with a focus on outcomes

The strategic goals for NIST are based straightforwardly on its mission to promote U.S. economic growth by working with industry to develop and apply technology, measurements, and standards. Performance measures for achieving these goals, especially for research and development aspects of the NIST mission are much less straightforward. The types of performance measures that have been used to date in the NIST budgeting process have all been quantitative and have mostly been measures of activity levels rather than outcomes. They are different for each of the four programs. Examples for ATP include number of competitions completed and number of technologies under commercialization. Examples for MEP include number of extension centers operating with NIST funding, and number of companies served by MEP extension services. Examples for the Quality Program include number of state and local quality award programs initiated, and number of state and local quality award programs supported. Examples for the Laboratories include number of cooperative research and development agreements (CRADAs) in effect during the fiscal year, number of new measurement methods/standards under development, and the number of calibrations/tests performed. It is commonly recognized that by themselves these quantitative measures of outputs imperfectly address the full dimensions of performance, especially the relevance and quality of the work being performed.

For GPRA, NIST plans to emphasize the peer review process in performance measure of its programs. Peer review is non-quantitative by its very nature, but if properly applied can effectively measure the degree to which NIST is perceived by its customers and stakeholders as fulfilling its mission. NIST feels that the present NRC review process of its laboratories, by its independence and high level of technical oversight, is well suited to this task. Peer review allows expert assessment of quantitative measures of performance that have and will be used, an assessment that can go beyond mere numbers to the quality and relevance of these measures.

The National Research Council's (NRC) peer-review, external assessment of NIST's R&D activities is performed annually by the Board on Assessment (BoA) of NIST programs, commissioned by NIST and convened by the Commission on Physical Sciences, Mathematics and Applications of the NRC. This assessment is based on extensive interaction (two- to three-day on-site program reviews plus other individual visits) of a total of about 150 scientists and engineers appointed by the NRC to the Board and its seven panels, organized so as to mirror the organization of NIST's laboratory-based programs. Since the final reports of the BoA and seven panels address the broad spectrum of NIST's R&D strategic planning levels, from missions of the individual Laboratories to assessment of individual technical programs, these reports provide considerable input towards assessing the performance of the laboratories as an entity.

The mismatch between the timetable of the GPRA/budget process and formal output of the NRC review process is a concern, but the annual and ongoing nature of the NRC assessment provides continuity that more than compensates for a time lag in the assessment process. NIST will explore the modification of its NRC review process, if it will be beneficial to NIST's implementation of the GPRA.

Performance of R&D is best measured by an aggregate assessment of the outcomes relative to goals and objectives in an organization's strategic plan. This assessment properly should be made on the basis of quality, relevance, and productivity. Although customer evaluation and internal assessment can address aspects of this assessment, peer review provides a perspective, a point of comparison that can be gained in no other way. Peer reviewers can answer questions such as these: Do NIST measurement capabilities surpass or are comparable to other national measurement laboratories in world? Does NIST meet the measurement needs required by industrial groups in high-technology fields? Has NIST developed fundamentally new measurement technologies that provide U.S. industry with competitive advantages in the world marketplace? And, the ultimate question: Has the U.S. economy been expanded because of NIST programs? These questions address the core performance of the organization and provide outcome measures (as defined in GPRA, Section 115, Paragraph (f), Number (2)), that assess the results of a program activity compared to its intended purpose.

Use of GPRA goals and information for program management, daily operations, and performance improvement

Business planning and performance evaluation are the hallmarks of good management--and are also the two basic components of the GPRA. The four NIST principals that I stated above underscore that NIST has already embodied the tenets of GPRA in its operations: NIST focuses on its unique mission; NIST includes stakeholders and customers in the development of its priorities; and, NIST relies heavily on the evaluation of its work to ensure that its impact is optimized. Thus, it is good management practices that drive NIST activities. NIST will continue these good management practices in responding to the requirements of GPRA.

Integration of financial and performance measurement in budgeting
Successful strategic planning requires integration of the program and budget planning processes. Funding for each NIST Laboratories is historically presented at the budget line item level, under the heading Scientific and Technical Research and Services (STRS). This financial reporting format is expected to continue, with the accompanying performance measurement information associated with the laboratories' strategic plan. Although they have not been in existence long enough for their full impact to be evident, the ATP, Quality and MEP are in the process of developing systems for evaluating performance, tracking both short-term and long-term indicators. These tracking systems will be described in their strategic plans. It is expected that the performance measures used in budgeting will be the same mix of quantitative and qualitative output and outcome measures as required for the GPRA.

Another aspect of integrating financial and performance measurement information has to do with the measured economic impact of NIST's R&D programs. Evaluations of the economic (financial) impact of NIST's R&D are carried out through NIST-commissioned Economic Impact Assessment studies of NIST's work in specific technical areas as I described above. These studies provide both qualitative assessments and quantitative estimates of the economic impacts resulting from the several categories of technology infrastructure that NIST provides to U.S. industry. Quantitative estimates are provided either as benefit-cost ratios or as internal (social) rates of return. The results of 12 laboratory research projects studied to date show that the rates of return from NIST research are high compared with private investments in technology and other public technology investments. These results are not surprising given that NIST targets its research at specific infrastructure problems, which are typically faced by a large number of firms and which have been identified through cooperative strategic planning with industry. The results of these impact assessments not only respond to the need to measure and analyze current and past performance, but they contribute to future strategic planning.

Implementation resource requirements, constraints and costs
The biggest constraint to implementing GPRA at NIST is the difficult task of developing concise and illustrative performance measures that meaningfully describe the impact and importance of NIST's R&D activities to the Nation's technological infrastructure and economic growth. The reasons for this difficulty are well known, but not necessarily well appreciated: the likely outcomes of research are not usually predictable in advance; the knowledge gained from research is not always of immediate value, nor is it necessarily easy to quantify; and, the path by which the results of research are transformed into products is not straightforward. Another constraint is the time and cost associated with instituting a new budget mechanism at the program levels, although program managers had similar activities in place before the GPRA legislation. This process has been additionally complicated by the present unpredictability of the budget process.

It is exceedingly difficult to predict either the cost or the benefit that will accrue to NIST because of GPRA. NIST spends about $1M each year to commission the NRC Board on Assessment of

NIST programs described above. This expenditure plus the time of NIST staff in preparation and execution is significant, but as also described above was initiated because it represents good management practice--not to satisfy any legislative mandate. A similar review process exists for the Quality Program through its Board of Overseers. Additional expenditures will be required to initiate the assessments that are under consideration for ATP and MEP. Again, these assessments were proposed to optimize the management and impact of these organizations not to directly respond to the legislative requirements of GPRA.

Thank you, Mr. Chairman. I will be pleased to answer any questions you may have.

Robert E. Hebner
Acting Deputy Director
National Institute of Standards & Technology

Robert E. Hebner received his Ph.D. in physics from the University of Missouri in 1971. He joined what was then the National Bureau of Standards as a presidential intern. Since that time he has advanced through increasingly responsible positions and is currently Acting Deputy Director of NIST.

His activities with other agencies have included assignments at the Office of Management and Budget, at Sandia National Laboratories, and most recently, at the Advanced Research Projects Agency of the Department of Defense. He has served as a member of the Advisory Committees for two NATO Advanced Study Institutes and has participated in the organization of many national and international conferences. Dr. Hebner was a member of the review committee for U.S. Department of Energy's Office of Energy Storage and Conservation in 1986 and on an NSF Panel for Engineering Research Equipment Grants. In addition, he served on the National Research Council's Committee to Conduct an Assessment on Establishing Underwater Arcs and Flames. He is a member of a Federal interagency committee to coordinate the U.S. research and communication program on the potential health effects of electric and magnetic fields. He was the principal investigator and the government's key witness in a celebrated court case involving an alleged novel approach to the efficient generation of electricity.

Throughout his career, Dr. Hebner has been active in technical activities having authored or coauthored more than fifty technical papers and reports. He is the past president of the Dielectrics and Electrical Insulation Society of the Institute of Electrical and Electronics Engineers. In addition, he has served on numerous technical committees which develop voluntary standards for the electric utility industry.

Dr. Hebner is a member of the American Association for the Advancement of Science, the American Physical Society, and is a fellow of the Institute of Electrical and Electronics Engineers.

The awards that he has received include the U.S. Department of Commerce Silver and Bronze Medals and the 1990 Harry Diamond Memorial Award given annually by the Institute of Electrical and Electronic Engineers for outstanding technical contributions in the field of government service. The award cites Dr. Hebner's contribution to the development of electrical measurements and standards for the electrical utility industry.

Mr. SCHIFF. Thank you, Dr. Hebner.

Ms. Josephson.

STATEMENT OF MS. DIANA JOSEPHSON, DEPUTY UNDER SECRETARY, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE

Ms. JOSEPHSON. Thank you.

Good afternoon, Mr. Chairman, and Members of the Committee. I am Diana Josephson, Deputy Under Secretary of the National Oceanic and Atmospheric Administration.

I appreciate this opportunity to discuss with you NOAA's progress and experience in implementing the GPRA. We are committed to strategic planning.

The second edition of NOAA's strategic plan for the year 2005 is now in printing. Initially developed in 1993 prior to the GPRA, the plan articulates the widely accepted set of goals and objectives which form the basis for program and budget decisions, and provides the framework for assessing performance in terms of outcomes.

Through participating as a GPRA pilot project, NOAA has gained experience not only in goal-setting measurement and reporting, but in learning how to institutionalize the principles of GPRA.

In developing and updating its strategic plan, NOAA goes beyond existing organizational structures to focus on future goals and programmatic requirements of the agency.

To facilitate cooperation across line offices and to foster implementation of the plan, intragency strategic planning teams have been established to coordinate activities supporting seven major goals.

The strategic plan guides the development of detailed five-year implementation plans which feed into annual budgets and annual operating plans.

NOAA seeks extensive internal and external participation to ensure that goals, objectives, and milestones reflect the needs and expectations of its customers.

Performance is assessed during quarterly reviews, and NOAA has incorporated actual performance measures in its annual audited financial statements to improve accountability and the linkage to resources.

The entire process has had a reinvigorating effect on NOAA, and I would encourage the Committee Members and staff to review my complete statement, as well as the executive summary of our plan, for a full description of progress.

I will now turn to some key issues of interest to the Committee:

First, I would like to discuss performance measurement and accountability. As I mentioned already, NOAA has developed performance measures for each of its seven strategic goals.

We design and evaluate our performance measures to address quantitative outcomes, not processes and activities. For example, we demonstrate improvement in short-term weather warnings by measuring the accuracy of our predictions, and the increase in lead times provided for severe weather events such as tornados and hurricanes, which are very pertinent today with Hurricane Bertha.

Credible weather information delivered in time saves life and property. As the General Accounting Office notes in its June 1966 Executive Guide to Implementing GPRA, in which our measures are cited as best practices, NOAA has decided to measure what counts.

Performance measures are the basis for accountability. NOAA as a mission agency is accountable for the quality of its services. We depend on research for improvements in both services and scientific understanding.

NOAA's goal to predict and assess decidual to centennial changes in the Earth's environment combines research, observations, and assessments to improve the knowledge of climate change.

Predicted capabilities developed for this goal may not be verifiable for 10 years to decades. In the interim, outputs can be measured but not outcomes. Since output measures do not adequately reflect results, qualitative measures are used to evaluate the quality of scientific information, its applicability to environmental policy decisions, and its utility to end users.

For example, our laboratories are evaluating both the global warming and ozone depleting potentials of proposed substitutes for CFCs to facilitate the rehabilitation of the ozone layer, while ensuring that viable replacements for CFCs do not contribute to global warming.

This type of interim output information, peer-reviewed for quality, is crucial for decision-makers faced with implementing policies for which the outcomes may not be known for decades.

For a mission agency like NOAA, accountability and research is needed to ensure the credibility of information which may be used to make decisions with significant economic and social consequences.

I now wanted to touch on your issues we have come across in making the strategic plan operational.

As I mentioned, we have designed a robust strategic planning process, but making this actually work on a day-to-day basis requires learning, iteration, and adaptation. I would like to highlight several significant issues that we have experienced.

First of all, buy-in is not automatic. NOAA has worked to achieve widespread buy-in both internal and external, and we have discovered the difficulty is not in setting the goals and objectives, but in establishing effective means to involve agency employees and external panel partners and customers in planning efforts to implement the goals.

Identifying mutual needs, expectations, and benefits, employing incentives for partnerships, and providing feedback are keys to success.

We have also discovered that goal-based budgeting is practical. As part of our annual budget process, we have submitted a budget to the Congress for the past three years in both the strategic plan format and the organization-based format.

This is an important mechanism for communicating with the Congress our GPRA efforts. Because NOAA's performance measures depend on the cross-cutting application of programs and resources and are not organizationally bound, the strategic plan budget is the clearest means of showing how dollars will support performance.

Progress toward performance-based budgeting must surmount existing organizational constraints. What we need to do now is adopt our strategic plan budget format as our official budget format.

Third, we have discovered the performance partnerships are increasingly crucial. One of the ways in which NOAA intends to proceed with the implementation of the GPRA is through the use of performance partnerships.

The reason these partnerships are important is because the tendency for any agency to not establish a particular performance measure or goal is due to its lack of complete authority or jurisdiction over a set of circumstances, activities, or policy choices which could lead to a particular outcome.

By establishing partnerships with other agencies or entities, shared outcomes become more achievable and broader societal goals can be met more effectively.

For example, NOAA works very closely with a number of other agencies at both the Federal and state level, private and public utilities, Treaty Tribes, and others in carrying out its Endangered Species Act responsibilities for salmon in the Columbia River Basin.

Mr. Chairman, this concludes my remarks. I would be pleased to respond to any questions.

[The prepared statement of Ms. Josephson follows:]

65

Testimony of

Diana H. Josephson
Deputy Under Secretary for Oceans and Atmosphere
National Oceanic and Atmospheric Administration
U. S. Department of Commerce

before the

Committee on Science
U. S. House of Representatives

July 10, 1996

Good morning, Mr. Chairman and Members of the Committee. I am Diana H. Josephson, Deputy Under Secretary of the National Oceanic and Atmospheric Administration (NOAA). I appreciate the opportunity to discuss with you our progress and experience to date within the National Oceanic and Atmospheric Administration toward implementation of the Government Performance and Results Act (GPRA) of 1993 (P.L. 103-62).

This is an important statute which holds great promise for improving the performance of public agencies, and improving the communication of our strategic goals, responsibilities, resource requirements, and performance. I commend the Committee for scheduling a very timely and useful oversight hearing on this matter.

Introduction

NOAA is committed to strategic planning. The current NOAA Strategic Plan, which was initially developed in 1993 and recently updated, articulates a widely accepted set of goals and objectives which have become the basis for NOAA program decisions. As is envisioned in the GPRA, this strategic plan has become (1) the framework within which NOAA makes its programmatic and budget decisions; and (2) the basis for assessing program performance in terms of outcomes. Prior to the development of the current strategic plan, NOAA also had considerable experience with strategic planning as part of its weather service modernization planning efforts and the development of the National Marine Fisheries Service (a NOAA Line Office) strategic plan, which commenced several years in advance of the GPRA.

NOAA also realizes that the framers of the GPRA envisioned ongoing consultation with the Congress and its respective committees in developing and implementing strategic plans. In fact, OMB Director Alice Rivlin recognized the importance of this consultation in her September, 1995 Memorandum, which noted that "discussions between Congressional staff, OMB, and the agencies may be useful in setting a framework for the required agency consultation with Congress on strategic plans. These discussions may also identify approaches to inform Congress more fully of forthcoming GPRA implementation activities."

While NOAA has much interaction with the Congress on a number of issues, especially with your Committee and the Resources Committee in the House of Representatives, it is in the spirit of this consultative role envisioned by the GPRA that we are here today. We would like to discuss with you our experience with the implementation of this new Act, and our overall strategic planning process within NOAA.

Overview of the GPRA

The purpose of the Government Performance and Results Act of 1993 is to improve the efficiency and effectiveness of Federal programs by establishing a system to set goals for program performance and to measure results. Specifically, it requires Federal agencies to:

(1) Develop a strategic plan, due to OMB and Congress, prior to the start of FY 1998.

(2) Prepare annual performance plans beginning with FY 1999; and

(3) Submit actual performance reports annually to Congress beginning on March 31, 2000.

The GPRA also required that beginning in FY 1994, at least 10 agencies participate in three-year pilot projects in program performance goal setting, measurement, and reporting. By September, 1994, there were 71 voluntary pilot projects in 27 department and agencies. The Department of Commerce solicited volunteers from within its bureaus to participate in pilot tests of GPRA implementation, and NOAA was one of four bureaus which chose to do so. (The other three bureaus, PTO, NTIS, and part of Census, are conducting a joint pilot in electronic information dissemination.) The Department continues to sponsor the pilot efforts actively.

Formulation of the NOAA Strategic Plan

By 1994, when NOAA volunteered to serve as a GPRA pilot project, it had already developed a strategic plan as a better way of doing business. By crafting a strategic plan NOAA established a widely and commonly accepted set of goals to guide program decisions. The plan provides a framework in which to present, understand, and justify agency budget and resource requirements.

NOAA embarked on its agency-wide strategic planning effort in March, 1993. In the development of its plan, NOAA focused on Administration, Department of Commerce, and agency goals with a ten-year strategic planning horizon. This was an intensive 90-day effort, which involved all of NOAA's senior managers, roughly 400 employees, and key constituents and stakeholders. To ensure success, senior managers were fully involved in the development and implementation of the Plan. In the development process, NOAA went beyond its existing organizational structure to focus on future requirements, and the mission and goals of the agency. To facilitate cooperative efforts across NOAA line offices, and to foster implementation of the plan, intra-agency teams were established to coordinate activities for each of NOAA's strategic goals.

These seven Strategic Planning Teams provided a crosscutting perspective within NOAA and were able to draw upon resources across NOAA Line Offices to specifically address each goal. Also, each of the team leaders was able to present to NOAA's leadership a clear focus on specific programmatic requirements necessary to carry out each goal. This new perspective has sharpened the vision of our agency-wide purpose, and facilitated a performance-based approach to achieving our goals. This process has had a reinvigorating effect on NOAA and its mission.

Throughout the process, NOAA sought extensive internal and external participation in creating and updating its Strategic Plan to ensure that our goals, objectives and performance measures reflect the needs and expectations of the customers we serve. NOAA drew heavily on its many university partnership arrangements, such as the Sea Grant University system and our joint institutes to solicit views from, and entrain the research community in our strategic planning process. NOAA utilized the Internet to solicit the views from some of its customers and constituent groups. NOAA also involved the Department of Commerce in its efforts and kept the Office of Management and Budget fully informed throughout the process, usually in the context of the annual budget cycles and through the submission of GPRA pilot project performance plans and reports.

NOAA's Vision, Mission and Goals

NOAA's strategic plan lays out the agency's vision, mission, goals, and objectives and describes how it intends to reach those goals. Performance measures and milestones have been developed to evaluate our progress in meeting those goals.

For the year 2005, NOAA envisions a world in which societal and economic decisions are coupled strongly with a comprehensive understanding of the environment. Our mission is to describe and predict changes in the Earth's environment, and conserve and manage wisely the Nation's coastal and marine resources to ensure sustainable economic opportunities.

NOAA's strategy for achieving this vision and mission consists of seven interrelated goals. Each goal is a coherent unit, but there are also important crosscutting relationships which enable the implementation and advancement of Federal, Department of Commerce, and NOAA goals. The programs are grouped within the two primary missions of *Environmental Assessment and Prediction* and *Environmental Stewardship*.

Environmental Assessment and Prediction Mission -- By 2005, NOAA will operate integrated environmental observation, assessment, and forecast services that enhance public safety and the Nation's economic and environmental security. To attain this vision, NOAA's investment strategy includes the following four strategic goals:

Advance Short-term Warning and Forecast Services that enhance public safety and the economic productivity of the Nation. NOAA will enhance its ability to observe, understand, and model the environment, and effectively disseminate products and services to users.

Implement Seasonal to Interannual Climate Forecasts to increase society's ability to mitigate economic losses and social disruption. NOAA, working with academic and multinational partners, will provide one-year lead-time forecasts of known skill of global climate variability, especially El-Niño and the consequent precipitation and surface temperature distributions.

Predict and Assess Decadal to Centennial Change in the global environment, specifically for climate change and greenhouse warming; ozone layer depletion; and air quality improvement to provide sound scientific input to challenging decisions.

Promote Safe Navigation by exploiting emerging technologies for mapping and surveying, thereby allowing merchant ships, fishing vessels and recreational boats to safely ply our coastal waters. NOAA will revolutionize U.S. marine and air navigation, mapping and surveying and assist commercial shipping in moving increased cargoes safely and efficiently.

Environmental Stewardship Mission -- NOAA envisions U.S. ocean and coastal areas with healthy ecosystems and the wise human use and development of ocean, coastal and living marine resources. Three of NOAA's strategic goals are directed toward attaining this vision:

Build Sustainable Fisheries to increase the Nation's wealth and quality of life through sustainable fisheries that support fishing industry jobs, safe and wholesome seafood and recreational opportunities.

Recover Protected Species in danger of extinction, and conserve other depleted or threatened species. By 2005, NOAA will be on the road to recovering every marine species at risk and maintaining healthy marine ecosystems upon which they depend.

Sustain Healthy Coasts by ensuring that economic development in coastal ecosystems of the U.S. is managed in ways that maintain biodiversity and long-term productivity for sustained use. By 2005, the Nation's coasts will have more productive habitats for fish and wildlife, and cleaner coastal waters for recreation and the production of seafood. Coastal communities will have thriving, sustainable economies based on well-planned development and healthy coastal ecosystems.

The execution of NOAA's goal-based strategy depends strongly on a stable infrastructure and administrative and human resources, as well as on the underlying capabilities of the agency as a national resource for research, observing systems, and environmental information services.

Performance Measures

NOAA has developed performance measures for each of its seven strategic goals. We continually reevaluate our performance measures to ensure that we measure outcomes, not processes and activities. We have made a great deal of progress in developing quantitative, outcome-based performance measures for some of our strategic goals such as Advance Short-Term Warning and Forecast Services. For example, we demonstrate improvement in this goal by measuring the accuracy of our predictions and the increase in lead times we provide for significant weather events. In cases of severe weather, these lead times make the critical difference in the protection of life and property. The following is a sample of some of the current performance measures for this goal:

	1995 Actual	1996 Est.	1997 Est.
Flash Flood Warnings			
Lead Time (min)	17	22	27
Accuracy (%)	58	64	74
Severe Thunderstorm Warnings			
Lead Time (min)	15	16	17
Accuracy (%)	75	80	82
Tornado Warnings			
Lead Time (min)	09	10	11
Accuracy (%)	60	64	66

Severe Coastal Event Warnings			
Hurricanes			
Accuracy of Landfall (km) with 24 Hr Lead Time	134	150	145
Temperature			
Correct Forecast (%)	84	85	86

Some of NOAA's other goals, such as Predict and Assess Decadal to Centennial Change, which is a program of research, observations and assessments to produce knowledge primarily about the Earth's climate, have long lead times for results and do not lend themselves to quantitative measures of progress. Many of the predictive capabilities being developed through the Decadal to Centennial goal may not be verifiable for 10 or more years. In the interim, outputs can be measured, but not outcomes. But output measures do not adequately reflect the effectiveness and results of the program. As a result, alternative, qualitative measures are being used to evaluate the quality of scientific information, applicability to national and international environmental policy decisions, and utility to other end users of this information. This is proving to be a challenging, but more useful approach to assess the performance of our research efforts. It allows NOAA, a mission-driven agency, to evaluate research in the context of its contribution to our mission.

Evaluation of Alternative Measures

For the Predict and Assess Decadal to Centennial Change goal, program quality will be assessed for the alternative measures through a process based on recommendations for research program evaluations in a report titled “Assessing Fundamental Science” sponsored by the National Science and Technology Council (NSTC). The report suggests that a panel, including scientific experts and users of the research evaluate research programs based on a set of pre-determined criteria.

Program quality will be evaluated by independent review panels such as the NOAA Panel on Climate and Global Change (PC&GC) and panels for the NOAA Environmental Research Laboratories (ERL). These independent review panels include scientists as well as stakeholders or users, such as those from the Intergovernmental Panel on Climate Change and United Nations Environment Program. Success and deficiencies in quality, approach, and methodology will be addressed in written reports by the Panel. The PC&GC meets annually; the ERLs each are reviewed on a three year cycle. Furthermore, the NOAA Chief Scientist conducts periodic reviews of NOAA science elements.

Criteria for evaluating programs addressing the above alternative measures are being developed this fiscal year. Programs will be deemed successful if the Panel gives them good scores for addressing the pre-determined criteria. Programs will be deemed minimally successful or unsuccessful if the Panel finds deficiencies and gives them poor scores; in all cases, panels will be asked to make suggestions for improvements to the programs. In addition to evaluation of past performance, peer review of the scientific quality of proposed research is conducted.

The following are a few examples of the qualitative performance measures that have been implemented for the Predict and Assess Decadal to Centennial Change goal:

(1) Evaluate and report the Global Warming Potentials of the proposed, viable substitutes for ozone depleting substances to avoid solving one issue at the expense of another;

(2) Document the "turnover" of the ozone-depleting chlorofluorocarbon (CFC) gases in order to verify the effectiveness of global policy actions; and

(3) Lead development of a peer reviewed initial scientific assessment of regional ozone in North America, including summarizing results for customers, which include State air-pollution managers.

We recognize that it is a challenge to measure progress towards achieving desired outcomes and results. Traditionally, government operations have focused on measuring their activities and processes, not the results that are achieved. We have made a good deal of progress in developing measures that truly indicate the results of our activities and programs. But we recognize that more work needs to be done. As such, we periodically review and revise our performance measures to make sure we have the right ones and will continue to do so as we move along in this process. We recognize, as do other agencies, that fully implementing and using these tools is a multi-year process. We are both pressing ahead vigorously with this effort and appreciative of the need to continually apply what we learn.

Achieving the Vision for 2005: Making the Strategic Plan Operational

NOAA conducts its strategic planning and budgeting activities according to an annual cycle that allows the agency to plan, budget, and continuously verify and validate performance. The strategic planning teams are active throughout the annual planning, budgeting and evaluation cycle. NOAA's strategy drives the entire cycle. NOAA has just completed updating its Strategic Plan and expects to revise it about every 3 years. The update utilized extensive input from our constituents and field structure. Products from each part of the annual cycle (strategic, implementation, operating plans) become input for the next phase.

From the Strategic Plan, the teams create a 5-Year Implementation Plan for each of the seven goals. The Implementation Plans set the course for meeting our vision for 2005 by identifying the work we want to do over the next five years to accomplish our goals. The plans set challenging but realistic performance measures and milestones to measure our progress towards reaching those goals and provide a five-year context in which NOAA management can make budget decisions. The plans are updated yearly.

Building on the Implementation Plans, the teams next develop budget initiatives based on our strategic goals. Budget requests are constrained by the five-year plans; if the activity is not identified in the plan, it cannot be put forward as a budget request. In developing the FY 1998 budget, NOAA took its first steps towards performance based budgeting by identifying improved performance that would result from the initiatives. This process will further strengthen NOAA as a results-based agency.

As part of the annual budget process, NOAA has been submitting its budget to the Congress for the past two years in both the strategic plan format and the traditional, organization-based format. As part of these submissions, and in an effort to familiarize the Congress with our strategic planning perspective, we have included a means for "crosswalking" between the two different formats as part of our Executive Summary of the budget. This effort will continue for the FY 1998 submission later this year. We believe that this is one of the more important mechanisms for communicating with the Congress our strategic planning and GPRA implementation efforts within NOAA. In addition, because NOAA's performance measures depend on the cross-cutting application of programs and resources, and are not organizationally-bound, the strategic plan budget is the clearest means of showing how our dollars support proposed work and performance.

Following the budget submission to the Department, NOAA's Line and Program Offices, who implement our programs, use the Implementation Plans to develop their yearly Operating Plans. The Operating Plans consist of detailed work milestones to be accomplished during the fiscal year. The plans are a performance contract between NOAA's executing units and its leadership. Fiscal resources, FTEs, performance measures and milestones are adjusted from the 5-year plan estimates to be consistent with the fiscal year appropriation and other constraints. NOAA management utilizes the milestones and performance measures in the Implementation and Operating Plans to track progress towards goals and to write performance plans and evaluations required by the GPRA. The performance of NOAA's Line Offices is assessed during quarterly and annual fiscal year reviews. The strategic planning teams participate in the 4th Quarter review by evaluating how well the Line and Program Offices implemented the strategic work objectives during the complete fiscal year. Such performance reviews provide an incentive to use performance measures in all aspects of NOAA's work.

In addition, NOAA is in the process of developing a comprehensive evaluation process to assess the progress we are making to reach all of our strategic goals.

Achievements of the Strategic Plan

The Strategic Plan has been an outstanding tool to help us explain what we are trying to achieve. The planning process allows us to manage thoughtfully, marshaling all of our resources to achieve our goals. The plan has also encouraged increased "buy-in" from all levels of agency management in working toward commonly stated goals and objectives.

We work actively with other bureaus of the Commerce Department to share our experience and hopefully raise the level and quality of strategic planning and performance measurement in bureaus which are just starting out in these efforts.

NOAA is also receiving recognition from outside communities on our strategic planning process. We have been cited by the National Academy of Public Administration (NAPA) and OMB as one of the ten best projects under the pilot phase of the GPRA. NAPA and OMB have also referred to our performance measures for advancing short-term warning and forecasts as "best practices."

GAO, in its June, 1996, Executive Guide to "Effectively Implementing the Government Performance and Results Act," cites a subset of NOAA's performance measures as a case illustration of critical practices in implementing the GPRA.

Areas for Improvement and Continuing Issues Associated with GPRA

Performance Partnerships

One of the other ways in which NOAA intends to proceed with its implementation of the GPRA is through the use of performance partnerships. The reason that these partnerships are important is because of the tendency for any agency to ***not*** establish a particular performance measure or goal due to its lack of complete authority or jurisdiction over a set of circumstances, activities, or policy choices which could lead to a particular outcome.

By establishing partnerships with other agencies or entities, these shared goals or outcomes become more achievable, and broader societal goals can be met, often in a more cost-effective way. For example, NOAA works very closely with a number of other agencies at both the Federal and state level, private and public utilities, treaty tribes, and others in carrying out its Endangered Species Act responsibilities for salmon in the Columbia River Basin, as part of its Recover Protected Species Goal. While NOAA has jurisdiction over part of the biological range of these unique and important stocks, other federal and state agencies have authority over many of the in-river activities which may impinge on these species and their habitat.

Without effective partnerships with these other entities, NOAA's stewardship mission for these resources becomes much more difficult to achieve. As you might expect, there are many other examples of existing or potential partnerships in which NOAA is likely to be engaged to carry out the seven goals of its Strategic Plan. One of these concerns the effective application of seasonal to interannual climate forecasts for the management of agricultural, water and energy resources. NOAA must work closely with other agencies including the USDA, DOE, USGS, etc., to ensure that resources are invested wisely and the information products can be utilized by customers.

Lessons Learned

The development of our strategic plan has taught us several lessons that will facilitate its continued implementation. The plan and the planning process must enjoy high level support from the agency's top managers. Employees must also support the plan and be able to see a direct connection to their everyday activities in order to operationalize the plan. To ensure employee, constituent and stakeholder buy-in, we have broadened involvement and consultation at each stage of the process. We continually seek comments and suggestions from our stakeholders and involve our line managers and team leaders directly in the preparation and development of the plan. We also fully integrate strategic teams as leaders and participants in all aspects of the budget process so that our goals truly drive policy and budget decisions.

We are using our set of GPRA performance measures in other contexts and in meeting other requirements (such as the CFO Act's audits) where they are appropriate. We believe this will go a long way in ensuring that NOAA sends out a single and consistent message to our customers, and to those examining our programs, while also reminding NOAA line managers and staff about what our key concerns are.

We must also keep in mind that a strategic plan should be a living document. All participants in the process must be flexible and willing to change portions of the plan when they can be improved upon, or when national needs or competing demands require that new courses be developed. Finally, perhaps the most important lesson that we've learned is that throughout the whole process one must keep focused on the vision. You will not be able to accomplish your goals without a clear vision of what you would like to achieve.

Mr. Chairman, that concludes my remarks. I am pleased to respond to any questions which you may have, either at this time, or at the conclusion of the panel.

Mr. SCHIFF. Thank you, Ms. Josephson.

Mr. Longset—Longest, excuse me.

STATEMENT OF MR. HENRY LONGEST II, DEPUTY ASSISTANT ADMINISTRATOR FOR MANAGEMENT, OFFICE OF RESEARCH & DEVELOPMENT, UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Mr. LONGEST. Good afternoon.

Mr. Chairman, and Members of the Committee, I am pleased to appear here today before the House Science Committee to discuss the Government Performance and Results Act.

To the Environmental Protection Agency, GPRA is not just seen as another compliance exercise, but instead as a fundamental change in the way we do business.

The Act brings together strategic planning and management, and it links performance and results.

The Administrator has recently taken some dramatic steps to integrate planning, budgeting, and accountability in EPA by establishing a new office for this purpose.

In the Office of Research and Development at EPA, the GPRA principles of improving public confidence in Federal agency performance by holding agencies accountable, and also improving Federal Government effectiveness and public accountability by promoting a focus on results, service, quality, and customer satisfaction are ones that ORD is incorporating into every facet of the way we do business.

In its new strategic plan, ORD has initiated an inclusive science planning process. This plan serves as the blueprint for the Fiscal Year 1997 budget, for the planning process, and to provide a basis for future budgets.

With the strategic plan, ORD has instituted a new system for determining research priorities based on risk assessment and risk management principles.

Within the comprehensive plan is a mission statement which translates into six long-term goals of research and development. The goals, which are listed in the testimony, help focus the research priorities.

GPRA states that there must be a description of how these goals and objectives will be achieved. ORD has responded by establishing a risk-based priority process that, among other things, applies a series of human health and ecological health, risk management criteria to a set of priorities according to their potential to support effective risk assessment and enhance risk reduction.

We applied this new priority-setting process and criteria the first time in 1995, and we identified six high-priority research topics for the next few years.

To meet the requirements of GPRA is not enough to establish goals and objectives without defining how to measure progress towards these goals, so we will use the measures of success noted in the testimony during the annual reviews of research programs and research plans.

Science research plans lay out the major research components and delineate the major outputs to be produced over the next three years. They also enable ORD to clearly track progress toward achieving its goals as required by GPRA.

For the Fiscal Year 1997 budget, ORD has developed performance measures that relate to the goals and objectives of the strategic plan.

GPRA represents a rare opportunity to move beyond a planning cycle that is confined to the budget cycle. The strategic plan is a blueprint for charting a course of strong, critical science at EPA into the next century.

Mr. Chairman, this concludes my prepared statement. I would be pleased to answer any questions.

[The prepared statement of Mr. Longest follows:]

68

STATEMENT OF
HENRY L. LONGEST, II
DEPUTY ASSISTANT ADMINISTRATOR FOR MANAGEMENT
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
COMMITTEE ON SCIENCE
HOUSE OF REPRESENTATIVES
WASHINGTON, D.C.

JULY 10, 1996

Good afternoon, Mr. Chairman and Members of the Committee. I am pleased to appear today before the House Science Committee to discuss the Government Performance and Results Act (GPRA) and our efforts at implementing various aspects of GPRA. At the Environmental Protection Agency (EPA), GPRA is not seen as just another compliance exercise, but instead as a fundamental change to the way we do business. We believe GPRA is the unifying initiative joining other forces for change to achieve a more efficient, responsive, and accountable government -- one that strengthens the American public's trust and respect for their government. The Act brings together strategic planning and management, and seeks to link performance and results.

Results-oriented management focuses attention on logical relationships linking strategic planning, explicit priorities, performance indicators, services, product delivery, and evaluation. It reflects an interactive process among inherent management functions common to all agencies (planning, budgeting, accountability):

- *Plan*...to achieve goals with integrity and assess progress.
- *Budget*...to ensure plans and goals can be carried out effectively.

- *Measure*...progress in achieving planned goals and efficient use of resources.
- *Link*...program results to budgeted resources and resources actually used.
- *Report*...on progress in achieving results and impacts on future efforts.

In order to do this, we must also develop management tools and processes that inform decision-making and demonstrate program results. Only by accomplishing these tasks can we enhance public confidence and make every dollar count in this era of great fiscal constraint.

The Administrator has recently taken some dramatic steps to integrate planning, budget and accountability in EPA, by establishing a new office for this purpose. This office is aiming to translate the recently published National Goals into agency-specific goals; to develop criteria for the selection of objectives to meet those goals; to prepare an agency-wide strategic plan to define directions for the future; to define how to measure progress and accountability; and develop an analytical function to provide an independent view to the Administrator about risk and other criteria, measures and accountability.

In the Office of Research and Development (ORD) at EPA, the GPRA principles of 1) improving public confidence in Federal agency performance by holding agencies accountable for achieving program results, and 2) improving Federal program effectiveness and public accountability by promoting a focus on results, service quality, and customer satisfaction, are ones that ORD is incorporating into every facet of the way it does business. From building a sound management foundation and risk-driven decision process that will assure credible, timely, and useful science, to participating in a government-wide R&D roundtable to collaborate on effective use of performance measures in managing research programs, ORD is committed to continuing to build upon the successful changes that we have made in recent years. Implementation of GPRA will provide continued impetus to ORD in our constant effort to become a more effective, efficient, forward-thinking organization.

In its new Strategic Plan, ORD has initiated an inclusive science planning process. This plan served as the blueprint for the FY 1997 budget planning process and will provide the basis for building future budgets. ORD's strategic planning process was established, in part, as a result of recommendations from a number of expert panels, committees, and boards, including the National Academy of Sciences' Committee on Research and Peer Review. With this Strategic Plan, ORD has instituted a new system for determining research priorities based on risk assessment and risk management principles. ORD uses this system to sharpen the focus of its research and direct resources where they can contribute most effectively to understanding and solving environmental problems, while also fully supporting EPA in fulfilling its mandates.

The purposes of the Plan are to provide a clear definition of the role of research and development in EPA which supports the Administrator's Annual Performance Plan as required by GPRA, to describe the process for prioritizing our science needs, and to articulate our long-term goals and near-term research priorities so that we focus available resources on the most important efforts.

Within this comprehensive Plan is a mission statement that commits ORD to the following critical mission areas:

- To perform research and development to identify, understand, and solve current and future environmental problems.
- To provide responsive technical support to EPA's mission.
- To integrate the work of ORD's scientific partners (other agencies, nations, private sector organizations, and academia).
- To provide national leadership in addressing emerging environmental issues, and in advancing the science and technology of risk assessment and risk management.

This mission statement translates into six long-term, overarching goals, broad areas of research and development where we believe ORD can and must make important contributions to EPA's mission and mandates, and to our nation's overall environmental research agenda. Those goals include:

- Developing scientifically sound approaches to assessing and characterizing risks to human health and the environment;
- Integrating human health and ecological assessment methods into a comprehensive multimedia assessment methodology;
- Providing commonsense and cost-effective approaches for preventing and managing risks;
- Providing credible, state-of-the-art risk assessments, methods, models, and guidance;
- Exchange of reliable scientific, engineering, and risk assessment/risk management information among private and public stakeholders; and
- Providing leadership and encouraging participation in identifying emerging environmental issues, characterizing the risks associated with these issues, and developing ways of preventing or reducing those risks.

The above goals and long-term research objectives defined within the goals help focus research priorities. GPRA states that there must be a description of how these goals and objectives will be achieved. ORD has responded by establishing a risk-based priority process that:

- Involves all parts of EPA, including ORD's own researchers and staff, in helping us set research priorities.
- Engages the external scientific community.
- Focuses on priority areas that clearly will contribute to fulfilling Agency mandates.
- Applies a series of human health, ecological health, and risk management criteria based on the risk assessment/risk management paradigm to set priorities according to their potential to support effective risk assessment and enhance risk reduction.
- Defines specific R&D projects by considering each topic area in totality.
- Develops and implements research plans/strategies for each identified high-priority topic.

We applied this new priority-setting process and criteria for the first time in 1995, when we used them to reexamine our ongoing research and identify important new initiatives. Based on this first application, we identified six high-priority research topics--some specific and others broad-based--for the next few years.

To meet the requirements of GPRA, it clearly is not enough to establish goals and objectives without defining how to measure progress toward those goals. In measuring the success of the Strategic Plan, the quality of ORD's work, and the usefulness of our research products, we will use the following measures of success:

- Performance: Is ORD achieving its goals?
- Significance: Is ORD working on the right issues?
- Relevance: Is ORD providing data that the Agency can use?
- Credibility: Is ORD doing research of the highest quality?
- Timeliness: Is ORD meeting EPA's expert consultation and assessment needs in a timely manner, and providing research products according to schedule?
- Advance Planning: Is ORD addressing long-term issues with adequate forethought and preparation?

ORD will use these measures during annual reviews of research programs and science research plans; external peer reviews of research plans and products, research proposals, and ORD Laboratories; annual science workshops; and in a data tracking system, part of ORD's Management Information System (OMIS), which tracks resources and progress. Through these mechanisms, ORD will strive to develop and conduct the most responsive, scientifically justifiable research program possible within the constraints of our available resources.

The Strategic Plan takes a high-level, long-term look at ORD activities and programs. In order to appropriately affect resource distribution, however, the Plan must be translated to a form that more directly relates to the Administrator's Annual Performance Plan and to the budget cycle. ORD accomplishes this task with science research plans. For each research topic selected through the priority-setting process in the Strategic Plan, Research Coordination Teams (RCTs) composed of ORD scientists and engineers as well as representatives of EPA's Program and Regional Offices are developing science research plans that:

- Lay out the major research components and directions we will pursue over the next few years.
- Describe how these components fit into the risk assessment/risk management paradigm.
- Delineate the major outputs to be produced over the next three years.

Peer reviewed research plans are important tools for measuring accountability because they make clear to our clients and stakeholders the rationale for and intended products of our research. They also enable ORD to clearly track progress toward achieving its goals, as required by GPRA. Currently, the peer reviewed plan for disinfection by-products in water is complete and being used for research planning. Other plans are under development and in various stages of peer review.

ORD integrates the science research plans with budgetary decisions in order to allocate resources to the selected research topics by laboratory program and research component. This helps ensure that our priority-setting decisions (guided by science) also reflect budgetary realities. Based on the research plans and budgetary decisions, ORD's Laboratories and Centers develop detailed plans for implementing each area of research to be undertaken internally. These laboratory implementation plans provide a blueprint for Laboratory and Center work, and form the basis for managerial oversight and guidance. For extramural research, ORD uses rigorous external peer review to evaluate both the proposals for and results of this research.

For the FY 1997 budget, ORD has developed performance measures that relate to the goals and objectives in the Strategic Plan. These measures are in a more narrative format than in prior years, providing greater insight into program activities and intended results. A number of factors, some related to the particular year and some due to the nature of research, made the development of these measures difficult:

- The uncertainty with regard to the FY 1996 budget made the development of FY 1997 measures complicated, since it was difficult to gauge current and future activity levels.
- Research is long-term, so that it is often problematic to establish definitive timeframes for outcome achievement.

- Research is most frequently conducted in support of Program Offices or Regions, so direct impact on the environment is difficult to measure.
- Some research outcome (e.g., favorable peer review) is difficult to quantify.

ORD is working to overcome these obstacles and develop the most accurate, relevant, and reliable performance measures possible.

GPRA represents a rare opportunity to move beyond a planning cycle that is confined to the budget cycle, never looking past the next fiscal year. EPA, and especially ORD as a research organization, is eager to take advantage of this opportunity. ORD continues to take steps that not only meet GPRA requirements, but also represent significant strategic changes to institute a more effective, risk-based research program. The Strategic Plan is a blueprint for charting a course of strong, credible science at EPA into the next century. ORD will approach the next millennium guided by GPRA, to ensure that the charted course leads to a more results-oriented, accountable future.

Mr. Chairman, that concludes my prepared statement. I would be pleased to answer any questions the Committee may have.

Mr. SCHIFF. Thank you.
Mr. Steinberg?

STATEMENT OF MR. GARY STEINBERG, DIRECTOR FOR STRATEGIC MANAGEMENT, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Mr. STEINBERG. Mr. Chairman and Members of the Committee, it is my pleasure to be here to discuss NASA's strategic management activities and our plans to implement the requirements of the Government Performance and Results Act.

In a post-cold-war era, the relevancy of NASA's mission was called into question. Growing demands for a balanced budget and more efficiency from government also began to affect the outlook for NASA's future.

These factors presented an opportunity for NASA to re-examine its mission, relevancy, and values to the Nation. GPRA and the National Performance Review also served as catalysts for NASA to develop a new strategic management process that will fully integrate planning, budgeting, execution, and evaluation activities.

We believe that the cornerstone of GPRA is the requirement for Departments and agencies to develop forward-looking strategic plans.

NASA's 1996 strategic plan represents our second update to our new planning process. Our plan is significantly improved with each update. In fact, our plan and our planning process are now considered as a benchmark by OMB and OPM.

Our 25-year strategic plan is responsive to our customers' requirements, while recognizing political, budgetary, and other factors. The plan, which was developed by the entire NASA senior management team, reflects inputs from our customers, stakeholders, and the NASA work force, and defines NASA's vision, mission, and goals.

Key elements of our new strategic framework include a customer focus, strategic enterprises, cross-cutting processes, and a set of strategies intended to revolutionize NASA.

Our strategic plan—the foundation of NASA's mission remains the Space Act of 1958. The mission presented in our strategic plan supports the original goals of the Space Act. Our mission is three-segmented:

To advance and communicate scientific knowledge and understanding about the Earth, the environment of Space, the Solar System, and the Universe;

To explore, use, and enable the development of Space for human enterprise;

And to research, develop, verify, and transfer advance aeronautic, Space, and related technologies.

Our strategic plan also presents agency-level goals and detailed enterprise goals that were developed in partnership with our stakeholders and customers and are also consistent with the mandates of the Space Act.

The plan also contains strategic road maps which identify specific near-term and mid-term goals that must be accomplished to achieve our long-term goals.

We have five strategic enterprises: Mission to Planet Earth; Aeronautics; Human Exploration and Development of Space; Space Science; and Space Technology.

Enterprise goals and objectives are incorporated into enterprise-specific strategic plans and serve as the basis for our GPRA performance plan.

We have developed metrics for many of the enterprise-level goals and objectives to enable performance evaluation. These metrics have been included in the agency's pilot GPRA performance plans, our CFO accountability report, and our Fiscal Year 1997 budget request.

We are making good progress in performance evaluation at the program level. Reviews are now conducted throughout the life of each major program to confirm compliance with cost, schedule, and performance targets.

Since the GAO report of 1993 we have gone from a median cost-overrun on our major programs of 77 percent to an average underrun of 5 percent on our current programs.

We recognize that NASA must continue to develop top-level agency and enterprise performance metrics. In addition to the enterprise metrics already mentioned, we are also developing an integrated set of agency level metrics that are aligned with the agency's mission and our goals.

We are actively seeking comments from our customers and stakeholders regarding our metrics. Our metrics have been reviewed by the NASA Advisory Council, OMB, and recently by staffers from this Committee, and their recommendations have been included in our new performance plan for 1996 which will be released shortly.

We view short-term goals as being more output oriented, and use metrics such as major milestones achieved, cost and development, time improvements, number of successful payloads flown, and the number of technologies transferred to industry to assess our short-term performance.

Our long-term goals are more outcome oriented focusing on the results of use of our data by scientists and educators, progress in the development of Space by the commercial sector, and the application of technologies by industry to develop new products and services for the commercial marketplace.

We and other Federal research and development organizations still face significant challenges in developing meaningful output and outcome metrics to assess performance and communicate results.

NASA is working with other agencies and forums such as the National Academy of Sciences, the National Science and Technology Council, and the Interagency Research Roundtable, to share ideas and concepts in areas of performance metrics.

Through our participation in these forums, we are confident that we will be prepared for formal implementation of GPRA by having strategic and performance plans that are consistent with the national priorities in research and development.

NASA is still assessing the potential resource requirements, constraints, and costs associated with formal implementation of GPRA. However, we believe that any resource requirements or costs incurred are necessary to help the agency to continue to improve in the area of strategic management.

In conclusion, NASA's new strategic management process will ensure an exciting future delivering important missions and results to our primary customers, including the American people.

NASA's vision as presented in our Strategic Plan states that NASA is an investment in America's future. As explorers, pioneers, and innovators, we boldly expand the frontier in Space to inspire and serve America, and to benefit the quality of life on Earth.

Implementation of our Strategic Plan supported by performance planning and evaluation at the program, enterprise, and agency level will help make this vision of the future a reality.

Mr. Chairman, this concludes my statements. I would be happy to address any questions.

[The prepared statement of Mr. Steinberg follows:]

Statement of
Gary A. Steinberg
Director for Strategic Management
Office of Policy and Plans
National Aeronautics and Space Administration

on the

Civilian Science Agencies' Implementation of the
Government Performance and Results Act

before the

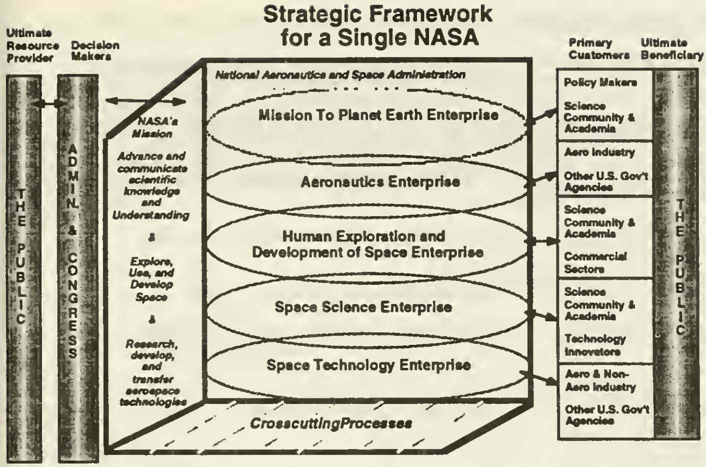
Committee on Science
U.S. House of Representatives

Mr. Chairman and Members of the Committee: It is my pleasure to be here this afternoon to discuss NASA's strategic management activities and our plans to implement the requirements for the Government Performance and Results Act.

NASA has made a commitment to strategically plan and manage the future of the Nation's civil aeronautics and space program. To achieve this commitment, the Agency has established a Strategic Planning and Management process that will fully integrate planning, budgeting, execution, and assessment and evaluation activities. This process is improving the way the Agency manages its affairs and makes decisions in the context of a comprehensive set of strategic and performance plans.

NASA has developed a Strategic Plan which is responsive to the requirements of the Agency's customers while recognizing political, budgetary, and other external and internal factors in its operational environment. This Plan was developed under the direction of the NASA Administrator by the Agency's Senior Management Group to define the future for the Nation's civil aeronautics and space program. The Plan reflects inputs from our customers, stakeholders, and the NASA workforce, and defines NASA's vision, mission, and goals. In addition, the Plan delineates implementation strategies and key decision rules for determining our priorities. The cornerstone of the Strategic Plan is a Strategic Framework based on customer-focused Strategic Enterprises (Mission to Planet Earth, Aeronautics, Human Exploration and Development of Space, Space Science, and Space Technology), crosscutting processes, and a set of strategies intended to revolutionize NASA .

Although NASA has made significant progress in the areas of strategic planning and performance evaluation, further challenges are ahead. Obtaining consensus on the future direction of the Nation's aeronautics and space program, and establishing meaningful performance assessment measures for our products and services have not been easy tasks. Development of improved mechanisms to communicate the value and relevancy of NASA's mission outcomes will also receive special attention in the months ahead.



Strategic Framework for a Single NASA

Ultimate Resource Provider
Decision Makers
THE PUBLIC
ADMIN. & CONGRESS
National Aeronautics and Space Administration
NASA's Mission
Advance and communicate scientific knowledge and Understanding
&
Explore, Use, and Develop Space
&
Research, develop, and transfer aerospace technologies
Mission To Planet Earth Enterprise
Aeronautics Enterprise
Human Exploration and Development of Space Enterprise
Space Science Enterprise
Space Technology Enterprise
CrosscuttingProcesses
Primary Customers
Ultimate Beneficiary
Policy Makers
Science Community & Academia
Aero Industry
Other U.S. Gov't Agencies
Science Community & Academia
Commercial Sectors
Science Community & Academia
Technology Innovators
Aero & Non-Aero Industry
Other U.S. Gov't Agencies
THE PUBLIC

Recognizing the need to change

Our efforts to reinvent NASA preceded the approval of the Government Performance and Results Act and the initiation of the President's National Performance Review. During the 1980's and early 1990's, NASA believed it was still delivering inspiring programs with outstanding results. However, some members of the public and Congress felt the Agency had lost its focus and was no longer the benchmark for excellence. In the Post-Cold War era, the relevancy of NASA's mission was called into question. Public confidence was shaken by mission failures, such as the Challenger accident, the initial problems with the Hubble Space Telescope, and the loss of the Mars Observer. In addition, with a lack of consensus on priorities and long-term goals, policy and political critics observed that NASA had become an Agency "Lost in Space."

With the growing demand for a balanced budget and more efficiency from Government, new budget realities also began to impact NASA's future. Whereas just a few years ago NASA's long-term plans assumed a budget approaching $30 billion by the year 2000, current projections illustrate the need for adjusted expectations. The end of the Cold War and a new budget environment presented NASA with an opportunity to reexamine its mission, relevancy, and value to the Nation. The President's National Performance Review helped bring these issues into focus by requiring NASA to measure what it does and why it is important. The National Performance Review also served as a catalyst to develop new ways of doing business, reduce infrastructure, and implement programs through a "faster, better, cheaper" approach that improve efficiency and eliminates redundancies. These dramatic changes highlighted the need for a balanced and relevant program of science, aeronautics, and human missions and were the primary factors behind the Agency's new Strategic Management process.

NASA's Mandates, Mission, and Goals

NASA was established by the National Aeronautics and Space Act of 1958, the foundation for our mission. The Act directs NASA to conduct space activities devoted to peaceful purposes for the benefit of all humankind. We are to preserve the leadership of the United States in aeronautics, space science and technology; expand knowledge of the Earth and space; conduct human activities in space; encourage the fullest commercial use of space; cooperate with other nations; and communicate the results of our efforts widely. These mandates, established almost four decades ago, remain the basic tenets for NASA's existence today, and are foundation for our mission as presented in the Agency's Strategic Plan:

- *To advance and communicate scientific knowledge and understanding of Earth, the environment of space, the solar system, and the universe*
- *To explore, use, and enable the development of space for human enterprise*
- *To research, develop, verify, and transfer advanced aeronautics, space, and related technologies*

The Agency's near- and long-term goals are also consistent with the mandates of the Space Act.

Near and Mid-Term Goals:

- *To be at the forefront of exploration and science;*
- *To develop and transfer to industry cutting-edge technologies in aeronautics and space to fulfill our National needs;*
- *To establish a permanent human presence in space, expanding and sustaining human exploration, use and development of space in our solar system and providing benefits in science, technology, and commerce that will contribute to a better life on Earth for this and future generations;*
- *To enrich our Nation's society and economy; and*
- *To communicate widely the content, relevancy, and excitement of NASA's missions and discoveries in order to inspire and to increase understanding and broad application of science and technology.*

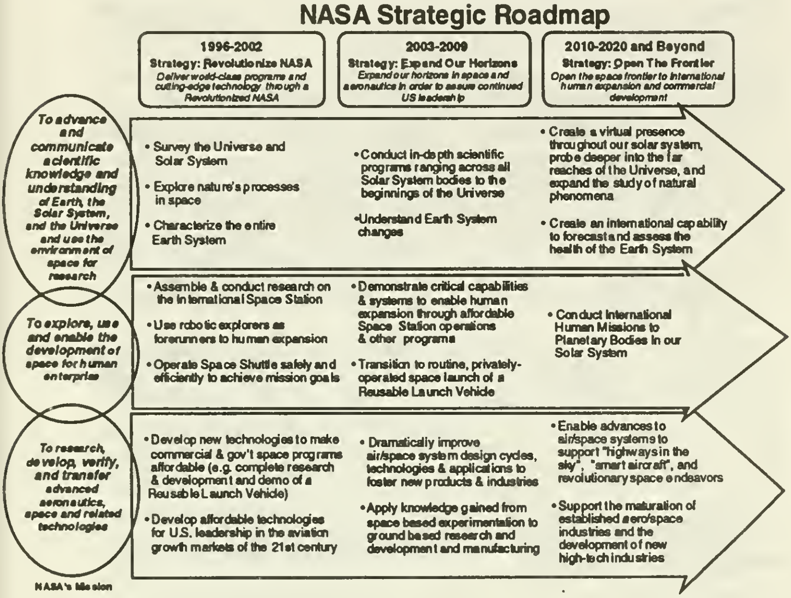
Long-Term Goals:

- *To undertake bold and noble challenges and share the excitement of NASA's future programs with our fellow citizens;*
- *To conduct international human missions to planetary bodies such as the Moon and Mars;*
- *To enable advances to air/space systems to support "highways in the sky," "smart aircraft," and revolutionary space endeavors;*
- *To support the maturation of established aero/space industries and the development of new high-tech industries;*

- *To enable humans to forecast and assess the health of the Earth system; and*

- *To establish a virtual presence throughout our solar system.*

The NASA Strategic Plan contains Roadmaps which identify specific activities that must be accomplished to achieve the near-, mid-, and long-term goals for our three missions. A top level Strategic Roadmap illustrates what needs to be done for Agencywide goals during three phases covering the next 25 years. The Plan also includes Roadmaps for each Strategic Enterprise that present more detailed goals to be achieved during this same timeframe.



NASA Strategic Roadmap

NASA's Mission	**1996-2002** **Strategy: Revolutionize NASA** *Deliver world-class programs and cutting-edge technology through a Revolutionized NASA*	**2003-2009** **Strategy: Expand Our Horizons** *Expand our horizons in space and aeronautics in order to assure continued US leadership*	**2010-2020 and Beyond** **Strategy: Open The Frontier** *Open the space frontier to international human expansion and commercial development*
To advance and communicate scientific knowledge and understanding of Earth, the Solar System, and the Universe and use the environment of space for research	• Survey the Universe and Solar System • Explore nature's processes in space • Characterize the entire Earth System	• Conduct in-depth scientific programs ranging across all Solar System bodies to the beginnings of the Universe • Understand Earth System changes	• Create a virtual presence throughout our solar system, probe deeper into the far reaches of the Universe, and expand the study of natural phenomena • Create an international capability to forecast and assess the health of the Earth System
To explore, use and enable the development of space for human enterprise	• Assemble & conduct research on the International Space Station • Use robotic explorers as forerunners to human expansion • Operate Space Shuttle safely and efficiently to achieve mission goals	• Demonstrate critical capabilities & systems to enable human expansion through affordable Space Station operations & other programs • Transition to routine, privately-operated space launch of a Reusable Launch Vehicle	• Conduct International Human Missions to Planetary Bodies in our Solar System
To research, develop, verify, and transfer advanced aeronautics, space and related technologies	• Develop new technologies to make commercial & gov't space programs affordable (e.g. complete research & development and demo of a Reusable Launch Vehicle) • Develop affordable technologies for U.S. leadership in the aviation growth markets of the 21st century	• Dramatically improve air/space system design cycles, technologies & applications to foster new products & industries • Apply knowledge gained from space based experimentation to ground based research and development and manufacturing	• Enable advances to air/space systems to support "highways in the sky", "smart aircraft", and revolutionary space endeavors • Support the maturation of established aero/space industries and the development of new high-tech industries

The Agency's mission, and our near- and long-term goals provide a foundation for the more detailed goals and objectives of NASA's Strategic Enterprises. These Enterprise goals and objectives are incorporated in Enterprise Strategic Plans and serve as the basis for the Agency's GPRA Performance Plan. Metrics have been developed for many of the Enterprise goals and objectives to enable performance evaluation. These metrics have been included in an Agency internal pilot GPRA Performance Plan for FY 95 and for FY 96, and the FY 1995 Accountability Report.

Results of Strategic Planning and Performance Evaluations Activities

In the area of performance evaluation we are making good progress. At the program level, reviews are conducted throughout the life of the program to confirm compliance with cost, schedule, and performance targets. These reviews also continually reaffirm that the outcomes of our programs remain relevant and provide valuable contributions to the Nation's needs. As a result of improvements in our program/project management system, which include the NASA Program Management Council's annual review of all major programs, we are conducting our programs with an improved focus on cost. Since the GAO Report of 1993, we have gone from a median cost overrun on our major programs of 77 percent to an average underrun of 5 percent on our current programs.

In addition to the reviews by the Program Management Council, NASA's Senior Management Council will periodically review Agency performance against the goals and objectives in the Strategic and Enterprise Plans, and NASA's Annual Government Performance and Results Act (GPRA) Performance Plan.

Our Enterprises have identified primary customers and are working with them to understand their requirements. This information is being used to ensure that the Enterprises have the goals and objectives that, when achieved, will result in value added outputs and outcomes for our customers. An excellent example of the progress that is being made in meeting customer needs can be seen in the results of a recent Aeronautics Enterprise customer survey. This survey, conducted on a triennial basis with a broad crosscut of NASA aeronautics customers, showed that the overall customer satisfaction levels for this Enterprise increased significantly from Fiscal Year 1992 to Fiscal Year 1995. On a scale of 1-10, 76 percent of the customers surveyed in 1992 rated Enterprise products and services at "5" or above and only 21 percent gave the Enterprise a rating of "8" or above. Using the same survey in 1995 revealed that 86 percent of the customers rated Enterprise products and services at "5" or above and 30 percent gave the Enterprise a rating of "8" or above.

NASA must continue to develop top-level Agency/Enterprise performance metrics, which will be used to assess performance against the goals and objectives stated in all our plans. NASA developed an internal pilot Performance Plan for FY 1995 that was reviewed by the NASA Advisory Council and OMB. The suggested recommendations and improvements to these metrics have been included in a Performance Plan for Fiscal Year 1996. These metrics have also been included in the Agency's FY 1997 budget request. Metrics addressed in the Performance Plan and the budget include measures of spacecraft costs, development time for flight projects, and launch rates for NASA's space science and Earth observation programs. The plan also addresses outcome measures and effectiveness indicators for activities focused on generating new knowledge, communicating knowledge, producing new technologies, and helping new technologies reach the commercial marketplace.

NASA and other Federal research and development organizations still face significant challenges to develop meaningful output and outcome metrics to assess performance and communicate results. NASA is working with other agencies, in forums such as the National Academy of Sciences, the National Science and Technology Council, and the interagency Research Roundtable to share ideas and concepts in the area of performance metrics. Through our participation in these forums, our internal performance planning activities, and our ongoing dialogue with the NASA Advisory Council, the Administration, and Congress, NASA is confident we will be prepared for the formal implementation of the

Government Performance and Results Act in September 1997, with goals and objectives that are consistent with the Nation's priorities in research and development.

In the months ahead, we will engage in further consultation with the White House, the Congress, OMB, other agencies, as well as our customers, stakeholders, and employees to fine tune our Strategic Plan and update the Enterprise Plans. We will comply with the GPRA directive for "congressional consultation." NASA is still assessing the potential resource requirements, constraints, and costs associated with the formal implementation of GPRA; we believe that any resource requirements or costs incurred are necessary to help the Agency continue to improve in the area of strategic management.

Challenges in Developing Metrics for Research and Development Goals

The discoveries, innovations, and new knowledge resulting from NASA's research and development programs do not normally become available until several years after the programs are initiated. In Space Science for example, the Galileo mission is providing extraordinary new insight into Jupiter, however, the mission was launched in 1989. The same latency effect also applies to our aeronautics programs. New technologies developed by NASA in the 1980s to support the advancement of commercial aviation, have been applied recently to new commercial aircraft provided by industry.

NASA cannot necessarily predict the outcomes of basic research programs. For example, two of the most spectacular discoveries made last year by the Hubble Telescope--the formation of new stars and a Jupiter-like planet in another solar system--were not planned outcomes of the Hubble program. These discoveries have, however, provided tremendous new knowledge about the universe around us.

NASA is not often in direct control of the outcomes of our research and development programs. For example, we can make cutting-edge new technologies, systems, and processes available to industry and other Government agencies, however, we cannot influence how they use them. We can make exciting new information about space and air travel, our planet's changing environment, the Moon, the Sun, and the universe around us available to teachers and student across America; however, we cannot prescribe how this information is used in the classroom. The same holds true for the data and information we make available to the science community and the general public.

Conclusion

NASA has an exciting history filled with tremendous accomplishments. With our new Strategic Plan and Strategic Management process, we will have an even more relevant and exciting future delivering important missions and valuable results to our primary customers, stakeholders, partners, and the American people. As the Agency's vision proudly states, *"NASA is an investment in America's future. As explorers, pioneers, and innovators, we boldly expand frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth."* Implementation of NASA's Strategic Plan, supported by performance evaluation at the program, Enterprise, and Agency levels, will help make this vision of the future a reality.

Mr. Chairman, this concludes my statement. I would be happy to address any questions at this time.

Mr. SCHIFF. Thank you very much, Mr. Steinberg.

I asked one question of the previous panel members, and you may have been here to hear it but let met restate it. That is, I am a member of the now-named Government Reform and Oversight Committee, which designed and passed the Government Performance and Results Act, and I know what our goal was.

Our goal was to try to persuade agencies to promote strategic planning and budgeting with specific milestones so that Congress would have some stronger basis for oversight to see how something is happening.

The problem is, sometimes Acts accomplish what you want them to accomplish, and sometimes they simply add another layer of reports and bureaucracy and something else that has to be done that is not really productive.

The comments you did make I thought were rather favorable to the Act, but I want to ask you directly and briefly, because we have a number of witnesses:

Basically, do your agencies approve of the Government Performance and Results Act—meaning, do you think this Act has the chance of actually achieving the goals that Congress is seeking in terms of actually a closer working relationship with administrative agencies?

Let me start with you, Dr. Petersen, if I may?

Dr. PETERSEN. Yes, with the flexibility that we believe is there, we think it will be a benefit to the National Science Foundation.

Mr. SCHIFF. Okay. Mr. Chupka?

Mr. CHUPKA. We embrace this Act with enthusiasm and gusto both from a corporate perspective, because we have a very difficult set of activities to manage, but also from the energy research perspective where there are some complications that have been identified by the previous panel, but where we believe that a long of progress can be made.

Mr. SCHIFF. Dr. Hebner?

Dr. HEBNER. As I stated in my opening statement, the Act does show great promise of doing a better job of aligning our internal planning process with the way that we communicate with Congress, so it shows promise for being an asset.

Mr. SCHIFF. Ms. Josephson?

Ms. JOSEPHSON. Strategic planning now permeates NOAA. The implications of it are realized in implementation plans, operating plans, which then translate into performance plans, so people's rewards go back to strategic planning. It permeates NOAA now, and we are very enthusiastic about it.

As I mentioned in my testimony, the one thing we need still to do, which I hope we will be able to do, is to translate this move into performance-based budgeting. We do all our budget decision-making in the context of our strategic plan. We make our decisions and our recommendations to the Administration and to you based on that planning process.

But then to translate these recommendations back into a traditional organization budget structure is very counterproductive. So I am hoping that as we move into full implementation of the plan, one of the things your Committee maybe should be looking at is what is a revised budget structure for the government which would translate strategic planning into the actual expenditure of dollars so that you will know that if you give us X amount that you are going to get Y outcome.

Mr. SCHIFF. Mr. Longest?

Mr. LONGEST. Yes. We embrace the concept. I would like to echo one other thing that was said concerning the need to tie the planning and budget management process to the budget process. Many of our scientists feel that many of the things they do are budget driven, as they determine it.

I think this Act is something that can move us away from that when we focus on the strategic plan and use that to set our goals and our outputs; but then it has to be tied to the budget process.

Mr. SCHIFF. Well I want to say to several of you, certainly it has to be tied to the budget. I think what we want is the policy to come first, and then say this is the budget; rather than policy being driven by the budget.

We cannot avoid that entirely because funds are not unlimited, but hopefully you want to have your ideas out front.

Mr. Steinberg?

Mr. STEINBERG. Yes, sir. We at NASA also embrace the Act. In fact, we believe it reinforces activities that we actually started before the Act was formalized.

We had started our strategic planning activities actually in 1992, talking with the outside world as well as our employees, to basically develop a consensus about our future.

We think that this is a smart Act. Having spent 10 years in industry doing this, I think this is good business and I believe the agency supports it.

Mr. SCHIFF. Thank you, very much.

That completes my questions.

Mr. Brown, you are recognized for such time as you might wish to consume.

Mr. BROWN. Thank you very much, Mr. Chairman. I will try not to be too consuming.

[Laughter.]

Mr. BROWN. Let me express my thanks to the witnesses for their presentations. Let me observe that almost any organization which engages in a certain amount of introspection, particularly analytical introspection, can probably find ways to better focus the organization and to improve whatever outputs that it can.

What bothers me is that there are in the area of science and technology, particularly as you start with the fundamental science and then move on down the chain, there are difficulties in quantification, measurement, even establishing goals except in the most general fashion. So it is a challenge to you to develop nonquantitative ways of evaluating your research.

For example, Ms. Josephson, you indicated the value of the products coming out of NOAA, which are undeniable, but can you relate the money that you are spending on, we'll say, a global climate model, rather, long-term climate models, can you relate that to a specific output?

I think it would be rather difficult to do. You know it is essential, but how do you determine whether or not you are doing the right level, the appropriate type, and so forth, of research on global pilot modeling?

I could ask the same question about much of what goes on at NSF, for example,

Ms. JOSEPHSON. Well, any number of the witnesses have mentioned there is obviously a major role for peer review in this area. We are part of the U.S. Global Climate Change Program, so our role in that is the result of intense interagency discussion and Administration discussion, and then our Congressional review.

However, in thinking about outcomes, we are playing a major role in contributing to the IPCC assessments. So there is an international validation process that goes on.

To the extent that our work is contributing to the global assessment of climate change, that gives us a qualitative way of evaluating whether we are doing the right things in the research area or not.

But you are right, it is not totally quantitative at this point.

Mr. BROWN. Well, this leads to some profound questions which we will not be able to get into——

Ms. JOSEPHSON. Right.

Mr. BROWN. But I can think of two huge corporations, AT&T and IBM, which maintain large research operations like you all maintain for the U.S. Government, and for some reason or other their customers and stakeholders, including the government, did not always create a favorable climate for them, and they ended up going through major restructuring and changes and dropping most of the research that they were doing.

Now is it possible the United States Government could come to that point?

It looks like it right now. We are slashing R&D across the board by what amounts to a quarter or a third over the next few years.

That of course is not due to the quality of the work being performed; it is due to external factors—the budget being the driver here.

I kind of wonder if we can get to the point where we can evaluate the overall long-term importance of the research and development that is being done here and determine a set of national priorities that would include that, but basically that is a decision for the Congress to make, not for the individual people here.

Let me ask you one additional question.

Is there a need to expand our capability and to train the personnel to do a better job of measuring the productivity of the research establishment?

Is there a need for something like we tried to do with the Technology Assessment Board that would evaluate incipient technologies to determine whether we even needed that particular technology where the potential adverse effects were greater than the potential beneficial effect? Or, that the direction of the technology perhaps was not as goal-oriented, or the goals were not as important as they should be?

In other words, a new discipline comparable to what we did in industry as we developed the concepts of industrial engineering, quality control, that sort of thing, which led industry to be more effective in identifying its ability to fulfill its goals, to meet its goals?

Would it help?

Is there a need, or am I just idle-speculating?

[No response.]

Mr. BROWN. Everybody leap to the fore here.

Ms. JOSEPHSON. That is right.

[Laughter.]

Mr. BROWN. I think, Ms. Petersen, you ought to be the one because, if such——

[Laughter.]

Mr. BROWN. Because if such a new discipline is needed, you ought to be funding it at the National Science Foundation.

Dr. PETERSEN. We certainly do look at areas of education and training needed to serve the science and engineering that we support. That is one of the advantages of the structure of the National Science Foundation.

As we have looked at this particular area thus far, we haven't yet found ourselves bereft of models or methods, but there are things that we—we believe there are questions that we cannot yet answer.

It is not clear that that requires a new discipline, but a new discipline may evolve from this entire area. We think right now we have enough to start out with, but it would be interesting to see if one does result from this exercise.

Mr. BROWN. Well, if I had my way you would be funding more philosophers, historians, and analysts of science and its impact on society than you do at the present time, but hopefully those people can be funded outside the normal bureaucratic structure of the National Science Foundation.

Thank you very much, Mr. Chairman.

Mr. SCHIFF. Thank you, Mr. Brown.

Mr. Olver, you are recognized for five minutes, more or less.

Mr. OLVER. Thank you, Mr. Chairman. I guess I did not quickly enough get up to leave so that everybody could go home.

[Laughter.]

Mr. OLVER. I wish I could really assess whether each of you who has said in one form or another that you embrace the GPRA legislation means it from the bottom of your heart, or if you are just there facing people who have something to do with your authorizing dollars and therefore feel that it is absolutely necessary to take that position and are therefore humoring us.

[Laughter.]

Mr. OLVER. I am a bit of a skeptic on this. I was here in 1993, and I certainly voted for the GPRA Act. I am not sure that I did so with any very strong feeling for how this was going to solve problems in the world.

I must say I am a skeptic about that. I suspect that in many ways it is just sand in the wheels of the process. I suspect that it is very difficult for us to quantify any kind of accountability on the R&D and agencies that you are dealing with.

It has been quite a numbers of years since I was a principal investigator on research grants that one or another of your agencies would have dealt with, though at one time or another I had Office of Naval Research, and Air Force's Office of Sponsored Research, and AEC, and NSF grants at least from three agencies at the same time. It probably would make you wonder how people can do that, but some people have research programs that cover a lot of people and seem to be very creative at it.

Anyway, I would like to ask—I am going to try to quantify here for a minute. Just a show of hands from the six agencies. How many of you take in grant proposals to do really basic research not directed by the Agency but by the principal investigators, completely out of the principal investigator's creativity?

[The following information was received for the record:]

The National Oceanic and Atmospheric Administration (NOAA) is a mission oriented agency and issues applied grants and R&D contracts that respond to mission needs. Basic research is to obtain new information to expand on current knowledge about a subject. NOAA does not issue basic research grants or contracts to principal investigators based on the investigator's creativity. Applied research is an investigative study where results will be used to solve a problem, answer a question or build on previous investigative studies.

[A show of hands.]

Mr. OLVER. DOE and NSF.

How many of you do take in—or send out RFPs for research that you think ought to be done but is not going to be done by your own scientists, and so you are asking to contract it out to get a piece of research done?

[The following information was received for the record:]

NOAA does not contract out for R&D. The National Marine Fisheries Service has issued R&D contracts for specific research needs such as aerial surveys, stock assessments and commercial/recreational statistics surveys. The National Weather Service issued one research contract in FY 1995. In addition, NOAA has established several cooperative and joint institutes with universities to provide long term relationships to address research needs in areas of mutual interest.

[A show of hands.]

Mr. OLVER. Probably almost everybody. My goodness.

Number three here. What does NIST do, if not one of those two?

[Laughter.]

Mr. OLVER. How would you characterize—what is it that you do if it is not one of those two, or maybe I have been obtuse in how I cast those descriptions?

Dr. HEBNER. Our primary—we've developed a measurement infrastructure using our in-house laboratory functions. The advanced technology program is actually a partnership with industry in which we look for ideas over a broad range of topics. The general "RFP" concept is: is there a technological problem that if solved would have broad-based benefits?

So we do not use an RFP-type mechanism to get there. The "RFP" is the same for everybody, and it is to see what are the best ideas for getting there.

So it is not——

Mr. OLVER. It is even more open-ended than the others, then, it sounds, in some ways, although not by NSF, I think.

Dr. HEBNER. Yes, it is somewhat more open, but it also—but it requires matching funds.

Mr. OLVER. Back in the days when I was vying for some of these things, to some degree one attempted to figure out, well, what was the agency interested in doing? AEC obviously is interested in some sort of reactor technology. And Energy, or even ONR, they would be interested in fuel cells or something.

So those kinds of things you knew where to go to. You would not necessarily take those to NSF. If you had some other idea, you took that to NSF because it seemed to be more open in what it might deal with.

But within that context, what percentage, if it is possible to go through this fairly quickly, if you can think about it quickly, what percentage of your proposals have a one-year payout? That is, a one-year time to the end of the grant?

[No response.]

Mr. OLVER. Two year? Nobody is using one year. That is fair enough. My goodness, thank God for that.

Two year?

[The following information was received for the record:]

NOAA may award proposals for multi-year efforts with grants up to three years awarded, but they are funded annually.

[A show of hands.]

Mr. OLVER. Three year?

[A show of hands.]

Mr. OLVER. Most of you are using sort of an expectation of about a three-year. Does anybody do an assessment at the end of a year, or two years, to see whether progress is being made?

[The following information was received for the record:]

NOAA reviews the performance of grant recipients annually for successful progress, even for multi-year awards.

Mr. OLVER.Have you ever terminated at the end of one year?

[Nods in the affirmative.]

[The following information was received for the record:]

Prior to any award, grant proposals are reviewed by peer or panel groups, or some other competitive review process. Because of the review process and involvement by the NOAA offices with the grant recipient, it is unusual for a multi-year grant to reach a "non-benefit" stage. However, a mechanism exists to terminate an award at any point during the funding cycle if it is not providing a benefit. Less than one percent (1%) of NOAA grants have been terminated during the first year for "non-benefit" because of the continual monitoring throughout the performance of the award. When multi-year grants are terminated, it is generally for management problems, or because funding is no longer available, but there are instances where inadequate progress was demonstrated by the recipient. Terminations of multi-year grants would normally occur when the grants are reviewed for annual renewal.

Mr. OLVER. You have actually terminated some. What percentage? Would people give a percentage of what you terminate at the end of one year?

Ms. JOSEPHSON. Small, I would say.

Mr. OLVER. Pardon?

Ms. JOSEPHSON. I would think it was small, but I don't know.

Mr. OLVER. You would think it would be small. I would guess it would be small.

Ms. JOSEPHSON. But I do not know the percentage.

Mr. OLVER. Under 10 percent? Would that be something fair? What would be the percentage that you might terminate after two years?

[No response.]

Mr. OLVER. I take it—I am hearing whispers in the 10 percent range. Well, okay——

Ms. JOSEPHSON. Well a lot of our research is done with cooperative institutes where we have ongoing relationships over many years, so it is much more cooperative than a pure research proposal kind of approach.

Mr. OLVER. And how many—what percentage—maybe this would be one worth quantifying—what percentage of your grants after what is basically your three-year pattern are then renewed for another three years on the basis that this is something that is producing, presumably producing something?

Do you do renewals beyond the first three years?

Ms. JOSEPHSON. In some cases.

Mr. OLVER. In some cases.

Ms. JOSEPHSON. But for some——

Mr. OLVER: What percentage go beyond the three year, that is a continuation of the first contract or proposal has led directly into a renewal proposal for another, say, three years?

[The following information was received for the record:]

Some grant recipients may successfully compete for a new award at the end of a three year award. The grants management office does not keep a separate accounting of how many recipients have been able to successfully compete for a new three year award at the conclusion of the original grant. Each grant application is reviewed for its individual merits and many are either peer reviewed or evaluated by a panel to determine which proposals will be supported.

Can you go down the line and give me just an off-the-top, or maybe this is not the sort of thing to get into the Congressional Record. Maybe I ought to allow you to answer these questions in writing because there is a set of—I am looking for some features here to see whether at the end of three years you are actually doing some sort of an assessment that says, yeah, we have got to see what sort of result there is.

I do not even know on basic research how you really measure—the accountability on how you measure what the benefit is compared with the cost. Benefits from basic research come in so many different ways, in so many different fields that are outside your own purview, it would be extremely difficult to assess what it is that has come in from that.

I must say, I am a skeptic. I guess I am going to finish at this point. If you are inclined to take the line of questioning and try to give some maybe even tabular or chart form to give us some quantification of how your granting process goes and where you are applying accountability, in essence, I must say I still remain somewhat of a skeptic as to whether or not it is possible to quantify the accountability on our R&D efforts here. Not that we should not perhaps try.

[The following information was received for the record:]

Accountability for grants resides in both the program office and the NOAA Grants Management Office. Technical accountability for the grant, review of the progress reports, site visits etc., are the responsibility of the program office. Financial accountability lies within the NOAA Grants office which audits the accounts of the grant recipients.

Mr. SCHIFF. I am going to have to ask that if you are going to respond at this point, to respond briefly to Mr. Olver's point, if you would.

Dr. PETERSEN. I cannot respond in terms of percents, but I would like to note that we really have this rigorous process of peer review at regular intervals for every project. So there is an assessment by experts.

Mr. OLVER. So if I were getting a grant now from NSF, I could expect a peer review and the end of one and two years? Or only at the end of the third?

Dr. PETERSEN. If a grant were made for a three-year period, there would not be another peer review until the end of that time. But you would then have to submit a new proposal describing what you have accomplished and what you intend to do in the future, and that would be peer-reviewed.

Mr. OLVER. That would be peer-reviewed.

Mr. CHUPKA. I would have to say the majority at the Department of Energy, the majority of three-year research efforts are renewed, but in the intervening period there can be redirection in terms of an ongoing process, as opposed to termination which is probably a very low probability, maybe on the order of 5 or 10 percent, there will often be some redirection of the project.

Dr. HEBNER. Let me respond a little bit to what Mr. Brown had raised, and what you had raised, and refer back to the earlier panel.

A critical step in this whole process is the intelligent judgment to set the priorities. Much of our work, as I had stated, was going to be 5 to 15 years where it is going to have its outcome and its impact.

We cannot make a judgment on today's project for tomorrow's funding based on what its impact is going to be 15 years from now. But what we can do is, having been in business for more than 15 years, look at what worked and what did not and use that to help us and guide us to make more intelligent decisions.

So the economic assessment helps us make informed decisions as to the qualities of the project and where they are going. It is one of the factors that has to be put on the plate when we consider those.

Ms. JOSEPHSON. One of the things—just to clarify for the record—we basically do not do basic research. We are a mission agency, so we do applied research to support our missions almost entirely.

But I would like to take the opportunity to respond to your questions in writing.

But one of the things that we are struggling with is, at the time we did our strategic plan and identified our goals and the directions we wanted to go in, I mean there was a research base in the agency supporting the programs.

Since that time we have had a science review by goal to look at, trying to reprioritize in relation to what we have identified as our long-range goals. That effort is difficult both to sort out and also to get the scientific buy-in because many of the scientists want to do their own thing.

I mean, that is the difficulty that was referred to by the earlier panel of dropping good things in order to do better things. That is a very painful process.

So we are currently struggling with sort of developing research strategies as the base for our seven goals. You know, each area has its own research base to support it.

This is a very interesting but very challenging process for us. It does not deal directly with the questions you are asking, but it puts it in a broader context of how do you take the resources, you are developing research—are devoted to research, and then making sure that they are really helping you get to where you have decided you want to go as a mission agency.

Mr. LONGEST. EPA also does resource research principally to support the mission, so we are not into the basic research approach. When you do that, you generally give a three-year grant; and it is part of our way of doing business. So then you are expecting a certain product at the end of that time.

There are other vehicles such as cooperative agreements. Cooperative agreements at the end of which period may be extended for some period of time. I think the distinction there is between basic research versus those who are doing the research to support a specific mission.

Mr. STEINBERG. I think the situation with NASA is primarily focused on applied research. Your question is rather pertinent in that the results of our activities are often not known for 10 or 15 years, and we deal with the same latency effects that the other agencies are dealing with.

We, I believe as with the other agencies, also have a peer review process for the selection of our research. Obviously the merit is the basis for the selection of the particular research investigation.

In terms of the termination percentage, I will have to provide you an answer for the record.

Mr. OLVER. I suspect it is very low. But, anyway, thank you for your patience, Mr. Chairman, and thank you for trying to respond.

Mr. SCHIFF. Well, Mr. Olver, thank you for your perseverance at this hearing. I appreciate that very, very much.

Ladies and gentlemen, we thank you very, very much for your testimony. We appreciate your telling us where things are at and where they are going.

With that, this hearing stands adjourned.

[Whereupon, at 2:20 p.m. Wednesday, July 10, 1996, the hearing was adjourned.]

[The following material was received for the record:]

Department of Energy
Washington, DC 20585

october 1, 1996

The Honorable Robert S. Walker
Chairman
Committee on Science
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

On July 10, 1996, Marc W. Chupka, Acting Assistant Secretary for Policy and International Affairs, testified regarding the implementation of the Government Performance and Results Act of 1993.

Enclosed are the answers to 12 questions submitted by you to complete the record.

If we can be of further assistance, please have your staff contact our Congressional Hearing Coordinator, Lillian Owen, on (202) 586-2031.

Sincerely,

Dirk Forrister
Assistant Secretary
Congressional, Public, and
Intergovernmental Affairs

Enclosures

Printed with soy ink on recycled paper

QUESTIONS FROM CHAIRMAN WALKER

Question 1: The General Accounting Office has asserted a lack of clarity in and a need to reevaluate the DOE's basic mission. How have you resolved conflicting stakeholder interests in the development of your strategic plan in order to reach consensus on goals and priorities?

Answer: In April 1994, the Department issued its first Strategic Plan, *Fueling a Competitive Economy*. It realigned the Department into five business lines (Energy Resources, Science and Technology, National Security, Environmental Quality, and Economic Productivity) and identified four critical success factors (Human Resources; Trust and Communication; Environment, Safety, and Health; and Management Practices) that were considered essential to improving performance in our daily operations. Following the development of the Department's mission, vision, and core values by the Department's leaders, nine planning teams were established, one for each of the business lines and critical success factors. Each team identified a vision, strategic goals, strategies, and success measures for their respective areas. Customers and stakeholders, including OMB, Congressional committees, other Federal Agencies, state and local governments, interest groups, safety boards, and others participated at some level in these team planning efforts. This process included thousands of individual comments and inputs to the Plan. It was during these planning sessions that conflicting stakeholder interests were addressed.

The Department will update its strategic plan beginning in January 1997 and will have it available in time to meet the September 30, 1997 GPRA requirement. This next plan will need to address some additional GPRA requirements that were not included in the first plan. One of these is to more formally ensure stakeholder and customer consultations in developing missions, strategic goals, and performance measures during the planning sessions for each of our business lines. The GPRA process also requires a final review of the plan by OMB and other appropriate agencies before its final release. Recognizing that many stakeholder groups have different and sometimes conflicting viewpoints, the review process allows for the presentation of those diverse opinions that have not been resolved. We would welcome the Committee's participation in this review process.

QUESTIONS FROM CHAIRMAN WALKER

Question 2: DOE's ability to achieve its research performance goals may be influenced by factors beyond its control. How does the Department take this into account in assessing performance? How does DOE sort out the impact of its research programs from other factors on some of the broad success indicators used in its strategic plan, such as "decrease energy use, amount of raw materials, and generation of waste per Gross Domestic Product?"

Answer: In general, when a program develops its strategic or annual performance goals and objectives, it first performs a situation analysis that includes the identification of planning assumptions, strengths, weaknesses, threats, and opportunities. It is this analysis that identifies the factors that are beyond one's immediate control and determines the risk associated with being successful. A program should be careful to commit to only those goals and objectives that it can reasonably achieve within the constraints of the planning assumptions. However, as good as these planning analyses may be, unexpected events do occur that affect outputs and outcomes. Through its performance measurement, evaluation, and self-assessment processes, the Department determines the causes responsible for not meeting a commitment. These causes, which may include factors beyond one's control, are analyzed and provide valuable feedback in the modification of existing or the preparation of new goals, objectives, strategies, and resource allocations.

Measuring the impact of research programs associated with broad, outcome oriented indicators, is not always straightforward. This is especially true for basic research programs which do not have specific applications in mind. In most cases, the benefits of the research are realized after the fact, when the research results are later applied in the development and production of products.

Because outcomes such as changes in energy usage are nearly impossible to predict in basic science programs, DOE has established four broad classes of success indicators for its programs' outputs and intermediate outcomes. These include; 1) quality of science, 2) relevance to DOE missions or national needs, 3) effective and efficient research program management, and 4) success in construction and operation of research facilities that meet user needs and requirements.

QUESTIONS FROM CHAIRMAN WALKER

Question 3: Since GPRA activities are primarily agency specific, how will DOE adequately assess those activities that involve research programs or have broad benefits across many agencies or fields of science? How are the agencies working together to address common GPRA implementation issues and establish consistent performance assessment methodologies?

Answer: Interagency coordination is performed through active participation in the National Science and Technology Council (NSTC) and other interagency fora. Office of Energy Research staff were active participants in the NSTC process to develop metrics for fundamental research and drafting and reviewing sections of the NSTC report. Office of Energy Research staff are also charter members of the Health and Human Services-led Interagency Research Round Table. The Round Table is a collaborative effort by members of 14 Federal R&D-related agencies to develop a way to measure output/outcome characteristics of hard-to-measure science activities, from analysis to basic research.

QUESTIONS FROM CHAIRMAN WALKER

Question 4: How do the bench scientists and research managers within the DOE complex feel about performance assessment? How do you assure that performance assessment is valued by and integrated into the organizational culture, rather than remain just a data collection activity?

Answer: ER-supported bench scientists and program managers are familiar with performance assessment. The allocation of scarce research resources has always depended to a great extent on merit review with peer evaluation as the primary allocation metric. This performance assessment philosophy also has been formalized through the use of Performance Based contracts with each of our laboratory operating contractors. These contracts now contain the four classes of success indicators that we apply to ourselves, namely: 1) quality of the science; 2) relevance to the DOE missions or national needs; 3) effective and efficient research program management; and 4) success in construction and operation of research facilities that meet user needs and requirements. Each bench scientist and research manager is evaluated with respect to one or more of these indicators.

QUESTIONS FROM CHAIRMAN WALKER

Question 5: In implementing the accountability provisions of GPRA, program managers will naturally tend to emphasize what they can count and, perhaps, what they think they can easily achieve. Will setting goals for science stifle creativity or risk-taking and encourage an overemphasis on outputs and outcomes that are countable? How does DOE assess the marginal benefit of investing incrementally in an existing field of science or technology versus investing in a fundamentally new, but less predictable, endeavor?

Answer: DOE's primary resource is its knowledgeable and experienced scientific staff which uses balanced performance assessment to help them assess benefits of their research plans. Balanced assessment of the various dimensions of program performance requires multiple sources and types of evidence, and DOE recognizes that measuring creativity is not quantitative. Peer review using some carefully selected metrics and output/outcome measures in a balanced way has been successful in maintaining high quality, highly relevant research programs. Reviewers assess probability of success and productivity, keeping in mind whether the research is in an existing field or at the forefront of scientific inquiry.

QUESTIONS FROM CHAIRMAN WALKER

Question 6: How will performance information in GPRA be linked to or used in planning and budgeting for research? What will happen to a research program if it cannot meet its performance goal?

Answer: ER will continue to use balanced performance assessment as discussed above to allocate scarce research resources. A research program that does not support meritorious, high quality, highly relevant projects will lose resources as they are reallocated to programs which identify, through merit review with peer evaluation and coordination with its various stakeholders, more promising endeavors.

QUESTIONS FROM CHAIRMAN WALKER

Question 7: Will the greater use of peer review stifle creativity by encouraging consensus, scientifically safe approaches? How do you ensure knowledgeable peer reviewers that are also objective and lack conflicts-of -interests? While peer reviewers may have the knowledge to evaluate the scientific merit of proposals, they probably lack the breadth to advise agencies on future R&D investment strategies. Should the research evaluation methodology of peer review panels be modified to improve outcome prediction? Do you have any recommendations to improve the peer review process?

Answer: Merit review with peer evaluation is a powerful and effective tool for enhancing relevance and productivity in Federal research and development. While recognizing the limitations of peer review, interagency science committees find it to be a valuable method for evaluating proposals and past progress of research and development projects and programs, major research facilities, and multi-year research plans and strategies. Peer review stimulates competition, establishes high standards for quality, rewards productivity, and on balance, fosters creativity.

Before being qualified as a peer reviewer, peers must be technically competent in the scientific and technical field under review. To ensure their independence, objectivity, and technical competence, we find peers without conflicts-of-interest from many sources, including industry, academia, and government agencies and associated laboratories. In addition, qualified peers base their review on the results of a formal evaluation utilizing specified criteria. The results of peer reviews are recorded and, under appropriate controls, accountable to further review.

Recognizing the importance of peer review, and having surveyed peer review practices at other Federal agencies, the Department of Energy intends to strengthen its use of peer review in three broad areas:

- First, while recognizing the need for flexibility and efficiency, the Department of Energy will seek to enhance the use and application of peer review .
- Second, the Department of Energy's management of its peer review process will be strengthened, including the establishment of guiding policies and principles, improved oversight, and broadened documentation of use.
- Third, the Department will be a leader in examining peer review processes and best practices, and in developing and implementing recommendations for improvements in the application of peer review to today's science and technology environment.

Peer review is supplemented by Federal Advisory Committee Act (FACA) chartered advisory committees to provide advice regarding multi-year research plans and strategies. DOE managers factor in the results of peer review and advisory committee reports together with considerations of agency and program mission when formulating research approaches and strategies.

The importance of knowledgeable people, interactions with the scientific community (technical conferences, user groups, etc.), stewardship responsibilities for laboratories, and core capabilities are all very important and legitimate inputs to decisions and performance evaluations.

QUESTIONS FROM CHAIRMAN WALKER

Question 8: In the past, DOE has used "success stories" to illustrate research program outcomes and achievements. What role will such stories play in the Department's performance assessment processes? Will indicators be developed to assess overall program performance in aggregate?

Answer: In a July 1996 report, the National Science and Technology Council addressed the role of success stories and other performance indicators for research. Balanced assessment of the various dimensions of research performance, they concluded, will require multiple sources and types of evidence. Beyond retrospective merit review, retrospective performance reports might draw on quantitative indicators, qualitative indicators, descriptive indicators or narrative text. It might also use examples of outstanding accomplishments (success stories) and of more typical levels of achievement, information about context, and findings from special studies and analyses.

QUESTIONS FROM CHAIRMAN WALKER

Question 9: Given the diversity of research activities that DOE supports, how do you plan to standardize assessment processes to establish priorities, allocate budgets, and evaluate overall agency performance?

Answer: The Department establishes priorities, allocates budgets, and evaluates overall agency performance using a Strategic Management System that links planning, budget formulation, budget execution, and evaluation. Each cycle begins with feedback from the previous cycle. Planning conducted by business lines, such as Science and Technology, establishes priorities. The process is designed to provide 5-year budget and staffing guidance, to make major issues and concerns highly visible, and to enable the Department's top management to make decisions in an efficient and timely manner.

QUESTIONS FROM CHAIRMAN WALKER

Question 10: DOE manages a system of national laboratories with diverse and overlapping defense and civilian programs run by different operating contractors. Will DOE ultimately require these laboratories to adopt GPRA-like performance assessment? How does DOE ensure a uniform planning and evaluation approach for this complex laboratory system?

Answer: The Department's Contract Reform Initiative has established the requirement that the Office of Energy Research's operating contracts with its laboratories be performance based. An annual appraisal is completed for each of its laboratories using the following four broad classes of success indicators: 1) quality of the science, 2) relevance to the DOE missions or national needs, 3) effective and efficient research program management; and 4) success in construction and operation of research facilities that meet user needs and requirements. Some contracts have an incentive fee that is linked to the contractor's annual performance. Further, the Department has created a Laboratory Operations Board and a Research and Development Council to enhance coordination across programs and laboratories and to improve efficiency and effectiveness. On March 4, 1996, Secretary O'Leary issued a memorandum implementing a Strategic Management System that defines the Department's strategic planning, budgeting, and program evaluation processes, including GPRA requirements. The scope of the System includes the cascading relationships between corporate level, business lines, program office, field offices, and contractors (including laboratories). Performance measurement provides the common element that links the Department's strategic goals, through the budget process, all the way down to the individual performance of federal and contractor employees.

QUESTIONS FROM CHAIRMAN WALKER

Question 11: How do you expect the implementation of GPRA will effect your interactions with the scientific community, Congress, and the public?

Answer: DOE expects the implementation of GPRA to result in better communication of its science programs' value between and among DOE, the scientific community, the Congress, and the public. By establishing a uniform approach for defining, measuring, and reporting performance, government agencies operating under GPRA will now have a common language and set of processes that will result in the better coordination and synergy of their science programs.

QUESTIONS FROM CHAIRMAN WALKER

Question 12: What do you believe are the primary benefits of GPRA for DOE? What are the costs of implementing GPRA? Do you think the benefits of GPRA will outweigh the costs?

Answer: GPRA represents good management practices. The Department of Energy believes that the strategic planning, budget formulation, program evaluation, quality, and performance-based management initiatives it has undertaken over the past three years are in complete alignment with the goals of GPRA. We have already seen improvements in program effectiveness and accountability through our focus on results, service quality, and customer satisfaction. We are working to avoid creating additional overhead as a result of GPRA. The Office of Energy Research uses its Strategic Plan, Implementation Plans, and Performance Plan to develop and support a streamlined budget process. Planning, and discussions made in the planning stages reduce the time needed in budget formulation. The new "management by results" philosophy established by GPRA will, in the long run, eliminate unnecessary costs. Performance assessment activities currently performed to maintain the high quality and productive research programs will continue. Additional resources will not be needed to continue performance assessment of Energy Research projects and programs. We expect that the benefits of GPRA will more than compensate for its costs.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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Committee on Science

August 1, 1996

Honorable Robert S. Walker
Chairman
Committee on Science
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This is in response to your letter of July 17, 1996 in which you enclosed additional questions for the record of your Committee's July 10 hearing on Civilian Science Agencies' Implementation of the Government Performance and Results Act, at which Mr. Henry Longest II, the Environmental Protection Agency's Deputy Assistant Administrator for Managment, testified.

The responses to the eight additional questions are enclosed. Please let me know if you have any questions about EPA's responses to these questions. Thank you.

Sincerely yours,

Robert W. Hickmott

Robert W. Hickmott
Associate Administrator
for Congressional and Legislative Affairs

Enclosure

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Qs and As from the GPRA Hearing

Question #1: Have you encountered conflicting stakeholder interests in developing your Strategic plan? If so, how have you resolved this challenge to reach consensus on research goals and priorities?

Answer : In defining research principals and priorities, ORD attempted to balance many different interests. The strategic Plan was based in part on recommendations from the National Research Council, EPA's Science Advisory Board, and a number of Blue Ribbon Panels and Advisory Committees . The Office of Research and Development (ORD) used comments from our internal Agency "customers," (EPA Regions and Program Offices), as well as numerous external stakeholders, including other Federal Agencies and interest groups such as the American Industrial Hygiene Association to improve ORD's focus and direction. While many commenters praised ORD's Draft Plan and initiatives to provide better Agency science, numerous comments advised us to expand our research agenda in various ways. Some believe much more emphasis is needed on anticipating tomorrow's "sleeping giant" environmental issues, while others advocate more applied research on new technologies and solutions. Still others want more attention focused on their program-specific concerns like wetland protection or pesticide registration. This diversity of comments amplifies the importance of ORD's research priority-setting to assure that scarce science dollars are strategically allocated in advancing the Agency's research goals and priorities.

Question #2: EPA has encountered some controversy on relative risk and resources allocated to solving the various environmental threats it has pursued. How is EPA addressing this disagreement, and how will it be reflected in the Agency's research strategy and goals?

Answer: Competing concerns are common in all sectors, and are taken into account in our yearly budget deliberations and priority-setting. ORD's Strategic plan describes the step-by-step deliberative process used to ascertain Agency research priorities. First, we involve all parts of EPA, including ORD's own researchers and staff, in helping us set research priorities. We also work with EPA's Science Advisory Board, the National Research Council, and the private sector early in the planning process to obtain recommendations from the external scientific community regarding major scientific directions and priorities. From this pool of potential research topics, we select areas that clearly will contribute to fulfilling Agency mandates. To these remaining areas falling within ORD's mission and goals, we apply a series of human health, ecological health, and risk management criteria to set priorities according to their potential to support effective risk assessment and enhance risk reduction. We then define our specific R&D projects by considering each topic area in totality, systematically examining the research needs within each component of the risk paradigm (effects, exposure, assessment, and risk management), Based on this analysis, we define a series of high-priority research activities across the risk paradigm that will produce a comprehensive set of useful risk-based results. Once we have identified our high-priority topics, we develop and implement a research program with specified roles for intramural and extramural participants, identifiable, products, and provisions for accountability and visibility regarding progress on our commitments.

EPA believes this system will support informed decision-making to address and ultimately resolve many controversies on environmental threats. However, in times of shrinking resources, it is important to remember that some needs must of necessity go unsatisfied. There are differing perspectives among practicing scientists and the regulatory programs, and there are competing needs a moung EPA's science programs. Tension continues between the need for fundamental ground-breaking research and the scientific information required to support Agency regulatory functions like compliance monitoring. Further, EPA's media programs like air and water have science information needs that must be addressed both individually and synergistically.

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Question #3:	Since GPRA activities are primarily agency specific, how will the EPA adequately assess those activities that involve research programs or have broad benefits across many agencies or fields of science? How will you assess the performance of EPA in the scientific partnerships you enter into? How are the agencies working together to address common GPRA implementation issues and establish consistent performance assessment methodologies?
Answer:	ORD, as the primary research organization in EPA, faces dilemmas that are common to all research organizations when developing performance assessment methodologies. Unlike many of the Program Offices within the Agency, ORD does not write regulations, enforce statutes, or issue permits. Rather, ORD supports the rest of the Agency in its efforts to accomplish these and many other tasks. It is therefore even more difficult, but not impossible, for ORD to tie its activities to environmental results. Also, given the long-term nature of most research undertakings, results of any kind are often years in coming.

It is no less important, however, for ORD or any research organization to maintain an effective performance assessment system. With so many ongoing, long-term efforts, an even more vigilant watch must be kept to ensure that research is headed down the right path and to correct wrong turns as early as possible. Good performance measures, of both the output and outcome types, are necessary to maintain such a course. Favorable peer review, for example, is often a good indicator that a given research effort is on the right track and that the program under consideration is one worthy of the resources being devoted to it. As is so in the rest of the government, time is too precious and dollars are too few to perform research that does not have a purpose. ORD's research addresses specific environmental problems, making their resolution more efficient and effective. Our success in these efforts will clearly have application beyond ORD.

ORD participates in the Federal Research Roundtable, which consists of representatives from research organizations across the government who come together in monthly meetings to discuss performance assessment. By sharing both failures and successes, we learn how to use performance measurement more effectively and consistently in managing research programs, and how to more quickly overcome our shared obstacles to GPRA implementation.

Question #4: How do the bench scientists and research managers feel about performance assessment? How do you assure that performance assessment is valued by and integrated into the organizational culture, rather than remain just a data collection activity?

Answer: ORD bench scientists and research managers, like much of the rest of the research community, see the value in performance assessment but also have concerns about its implementation. Given the long-term nature of many research undertakings, it is often difficult to establish short-term performance measures that link to long-term results. In addition, many outside factors over which scientists and managers have little or no control can affect whether results are achieved on schedule or at all. This being the case, they nevertheless realize that accountability is a necessary and productive part of any effective organization.

It is therefore absolutely essential that all members of ORD have an active role in designing its performance assessment system. Reflecting this concern, the first step in our priority-setting process as established in our new Strategic Plan states: "First, we involve all parts of EPA, ***including ORD's own researchers and staff, in helping us set research priorities.*** " These same researchers and staff are also involved in the creation of performance measures, simultaneously 1) assuring that their programmatic knowledge is utilized and 2) obtaining their commitment to the achievement of results. The measures that are established will also be incorporated into employee performance standards and ORD's Management Information System, further integrating the performance assessment system into the organizational culture.

Question #5: Will the greater use of peer review stifle creativity by encouraging consensus, scientifically safe approaches? How do you ensure knowledgeable peer reviewers that are also objective and lack conflicts-of-interest? While peer reviewers may have the knowledge to evaluate the scientific merit of proposals, they probably lack the breadth to advise agencies on future R&D investment strategies. Should the research evaluation methodology of peer review panels be modified to improve outcome prediction? Do you have any recommendations to improve the peer review process?

Answer: The question implying that peer review stifles creativity is somewhat surprising. Scientific peer review is a time-honored method of evaluating the scientific credibility of new scientific work. For this reason, a primary question is whether the work is, in fact, new. In this sense, one task of peer review is to identify work that is merely repetitive.

Considerable thought and creativity go into producing new scientific work. New information and ground-breaking scientific ideas emerge and gain acceptance when informed and critical "peers" study and comment on the new work. Knowing that peer review is expected -- that is, that experts in the field will study and evaluate the work -- actually serves as a stimulus to "sharpen" the work product and advance the field, rather than to limit innovation.

Regarding peer reviewer objectivity and conflicts of interests, EPA's 1994 Peer Review Policy and its associated Standard Operating Procedures (SOPs) provide relevant guidance. The SOPs specify that peer reviewers should be selected for independence and scientific/technical expertise. Ideally, peer reviewers should be free of real or perceived conflicts-of-interest. For a panel review, the reviewers should represent a balanced range of technically legitimate points of view.

Various methods are available to the Agency to identify and limit potential conflicts-of-interest. These include attention to the employment, financial, and professional affiliations of the participants, and filing Confidential Financial Disclosure Forms (SF-450) for members of Federal Advisory Committees. Other widely practiced methods include exploring directly the issue of potential conflicts with each of the identified participants before the review process takes place, and disclosing publicly at the beginning of a peer review any previous involvement with the issue.

Regarding investment strategies and evaluation methodology, the peer review concept assumes that reviewers have substantial expertise and experience relating to the issue under study. For this reason, reviewers for investment strategies would include experts with experience in that specialized area. Ideally, a panel for a review of this type would include persons with experience to evaluate both scientific merit and investment strategies. In other words, EPA does not use narrowly constructed panels to advise on broad goals or research, but rather seeks panels with the expertise required for the full range of issues under review.

EPA's Science Advisory Board, the National Research Council, and the Office of Research and Development's new Board of Scientific Councilors all have the capacity to form special committees for special purposes. The SAB's "Research Strategies Advisory Committee" and the NRC's committee on "Research Opportunities and Priorities for EPA" are two current examples. The recommendations from these broadly constituted panels are then used by EPA to develop research investments.

The peer review process at EPA can best be improved by careful, advance planning and attention. Greater attention on peer review activities by senior management in setting their office priorities and committing their budget and resource allocations is needed. Planning needs to adhere to established principles of objectivity and independence rather than taking short-cuts for expediency. This will greatly assist the Agency in producing credible work products which are honed by peer review. Other specific recommendations include a better tracking and filing system for peer review activities, and training for personnel to make better decisions about what work products should be peer reviewed and to identify the appropriate peer review mechanism.

Question #6: How will performance information in GPRA be linked to or used in planning and budgeting for research? What will happen to a research program if it cannot meet its performance goal?

Answer: For a performance assessment system to be taken seriously, it must ultimately impact future resource distribution decisions. ORD has taken the first step toward effecting this change by translating its recently published strategic plan down to the operational level. The section of the plan entitled “Translating ORD’s Strategic Plan Into a Research Program” (pp. 15-17) describes how, once high-priority research projects are selected, they are then translated into: 1) Science Research Plans into 2) Budget Operating Plans into 3) Laboratory Implementation Plans, which provide detailed plans for implementing each area of research to be undertaken. Finally, we are requesting all of our Labs and Centers to explain how the programs for which they request resources support the goals and objectives in the strategic plan.

Labs and Centers will also be required to submit output and outcome measures. These measures will be used during the planning and budgeting process to reveal where programs are exceeding or not meeting their stated expectations, and investment/disinvestment decisions will be made accordingly. Research programs that cannot meet their performance goals will be asked to explain why, and will face possible decreases in funding if their explanations are judged by ORD’s senior leadership to be unconvincing. Performance information thereby informs the budget process and provides a time horizon beyond the current fiscal year.

Question #7: How do you expect the implementation of GPRA will affect your interactions with the scientific community, Congress, and the public?

Answer: GPRA implementation will only serve to improve ORD's already positive relationships with the scientific community, Congress, and the public. As we develop and institutionalize a performance assessment system, these stakeholders will be able to more clearly see where we our heading and exactly what our research objectives are. Such a system will allow the scientific community to locate areas of ORD research that compliment or conflict with their own efforts. We can then more easily determine how to work together to achieve the most efficient and effective overall results. In addition, our performance assessment system will serve to increase ORD's transparency, providing for Congress even more direct links between resources expended and results achieved. Congress can then make better informed decisions about which research areas are to receive increases or decreases in funding. Finally, through GPRA implementation the public will see how their tax dollars are being spent by ORD to decrease the risks to their health and environment. They will therefore be more knowledgeable as they comment on proposed rules and regulations.

Question #8: What do you believe are the primary benefits of GPRA for the EPA's Office of Research and Development? What are the costs of implementing GPRA? Do you think the benefits of GPRA will outweigh the costs?

Answer: GPRA is forcing not only ORD but the entire agency to reexamine its priorities, goals, and the way it goes about achieving those goals. One of the primary results of GPRA implementation for all government agencies will be increased long- and short-term accountability, both to senior management within the agencies and to Congress and the public as external stakeholders. Most research organizations, including ORD, have historically found it very difficult to break down research efforts that will last for a number of years into a list of short-term objectives that must be achieved for long-term success. GPRA requires that we do just this, and in so doing encourages us to more carefully monitor our progress toward our ultimate goals. Ideally we will then be able to make earlier course corrections and our programs will be run with increased efficiency and effectiveness.

The costs of GPRA implementation for ORD are of two kinds: 1) data collection needs are greater, and therefore more resources must be expended to collect these data; 2) GPRA requires a shift in thinking among many in the resource community, possibly resulting in a brief period of confusion and resistance to change. ORD is making every effort to minimize this latter element by allowing all of its employees to participate in the changes that are occurring. They are substantively involved in the development of everything from the strategic plan to performance measures, and therefore have a stake in the success of these efforts. ORD views increased data collection costs as a necessary cost of doing business in a more productive and results-oriented manner.

We in ORD believe the benefits of GPRA clearly outweigh the costs. By developing a more transparent, accountable organization, ORD will engender support from those outside the office (including other offices within EPA, some of our primary customers), and will allow its own hard-working employees to see the positive and significant results of their efforts.

ORD's actions are reflected in EPA's broader efforts to design and implement an integrated planning, budget, and accountability (PBA) system that will be fully compliant with GPRA while also serving to further other EPA purposes. The Agency is committing significant resources and senior management attention to the PBA system.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20502

RECEIVED
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Committee on Science

July 31, 1996

The Honorable R. S. Walker
Chairman
Committee on Science
U.S. House of Representatives
Washington, DC 20515-6301

Dear Mr. Chairman:

Attached are answers to the questions you asked me to address in response to my participation in the July 10, 1996 hearing on the implementation of the Government Performance and Results Act (GPRA). I appreciated the opportunity to appear before the Committee to provide the Administration's views on how fundamental science should be assessed within the context of GPRA. I would be happy to answer additional questions as the Committee continues to consider the implementation of GPRA.

Sincerely,

Ernest J. Moniz
Associate Director for Science

Question 1: How should performance assessment be used in setting priorities and allocating budgets? Is intercomparability across different fields of science possible?

Answer: In the context of GPRA, the purpose of performance assessment is to determine whether a program or agency has met the goals previously defined for it. Goals are set in strategic plans. These plans are used to establish priorities. Budget allocation is guided by assessment of success in carrying out the strategic plan. Although the results of performance assessment are retrospective, they may provide information that is useful for future planning and management. For example, performance information might reveal opportunities for improving efficiency through the elimination of bottlenecks or other major obstacles. We anticipate that additional lessons will be learned as GPRA is implemented.

Performance assessment is one of several sources of information used in determining what may be feasible in the future, but it does not provide predictions about future outputs, outcomes and impacts of science programs. For basic research, there cannot be an evaluation system that provides comprehensive measures for the eventual outcomes and impacts of an individual science program, much less a system that provides measures that would be comparable across different fields of science.

The process of setting priorities and allocating budgets is guided principally by what we hope to achieve. Science programs are intended to contribute ultimately to over-arching national goals, such as national security, quality of life, and economic prosperity. Nevertheless, the manner in which specific programs do so is dramatically different. For example, procurement of military hardware contributes rather directly to the national security goal, whereas an undergirding activity, such as fundamental scientific research, contributes broadly to national goals over a very long time period. To assure the contribution of fundamental science to over-arching national goals, the Administration has established the essential enabling goal of leadership across the frontiers of scientific knowledge.

Question 2: Will setting goals for science stifle creativity or risk-taking and encourage an overemphasis on outputs and outcomes that are countable, especially in basic science?

Answer: The question raises a legitimate concern that an overly simple approach to setting goals and measuring results will create a system of incentives that are skewed away from what we are trying to accomplish. As long as the flexibility provided by GPRA is preserved, it will be possible to specify a richer set of goals and assessment methods than would be permitted by rigid application of mechanistic quantitative algorithms. To assure preservation of the needed flexibility, it will be necessary to enlist the understanding of all involved in the planning, management, conduct, and oversight of Federal science programs. The recent NSTC/OSTP report, "Assessing Fundamental Science," is intended to promote understanding of the issues.

Question 3: What lessons have been learned about research evaluation from the GPRA pilot projects and how will these lessons be transmitted to other research agencies?

Answer: We do not have final conclusions from all GPRA pilots, but initial findings include:

> The GPRA legislation has been helpful to agencies in focusing attention of agency personnel, partners, and stakeholders on goals; translating goals into operational targets; and beginning construction of better management information systems to support performance assessment.
>
> Not all dimensions of research outputs, outcomes, and impacts can be measured. Many important dimensions cannot be captured by conventional measurement or assessment techniques.
>
> Because of long lags between research results and their eventual applications, and because of the many intermediating factors (e.g., patent and regulatory policies, technological innovation, public understanding, and professional practice), it is extremely difficult to establish links between the immediate outputs of Federal science programs and their eventual long-run effects. The difficulty is relatively greater for basic research than for applied R&D.
>
> Agencies are engaged in exploratory efforts to develop better methods for research evaluation. For at least some fundamental science programs, it will be necessary to apply to OMB to use the "alternative" approach under GPRA. The "alternative" approach requires statement of clear criteria for determining the success or failure of a program, but it does not require specification of measurable quantitative goals.
>
> Merit review with peer evaluation is an important tool for assuring that Federal research programs are conducted at world-class levels.

Sharing of experience from the GPRA pilots and other agency efforts occurs though a number of channels. These include:

> Continuing discussions among the members of the NSTC and the NSTC/OSTP report, "Assessing Fundamental Science," which distills public and private experience to date with assessment of fundamental science;
>
> OMB efforts to integrate and distribute information about agencies' experience with GPRA (e.g., a joint project undertaken by OMB, the agencies, and the American Society for Public Administration to produce a series of GPRA case studies); and
>
> Participation of agency staff in meetings of the informal Federal Research Assessment Network and Research Round Table.

Question 4: Agencies seem to be emphasizing peer review in assessing research performance. Will greater use of peer review stifle creativity by encouraging consensus, scientifically safe, approaches? Can, or should, anything be done to improve the research evaluation methodology of peer review panels in order to enhance outcome prediction?

Answer: The cornerstone of the effort to build world-class science will continue to be merit review with peer evaluation. This will assure the excellence of agency programs and their contribution to the leadership status of the U.S. and thus to our over-arching national goals.

The question rightly implies that extreme care must be taken to assure that the criteria used by a review panel should accurately represent program goals; the criteria should not set up unintended incentives that are counter productive. "Assessing Fundamental Science" specifically calls for use of indicators that encourage risk taking.

The purpose of merit review with peer evaluation is to assure that research is undertaken at the cutting edge. We are not aware of an alternative method to assure the world-class quality of U.S. science. Merit review is not, however, intended to predict the overall pattern of long-run outcomes and impacts flowing from the eventual application of research results.

Question 5: Will GPRA instill greater confidence in federal science programs by enabling greater disclosure, analysis, and dissemination of performance information to the public?

Answer: The science agencies are building on earlier efforts to measure, describe, track, or otherwise capture results of their programs in order to develop better information about program performance and communicate this information to the public. We hope that improved public understanding will engender greater confidence. In addition, the strategic planning component of GPRA will help the agencies articulate their missions and programs more effectively.

Question 6: The GPRA gave OMB the responsibility for approving the strategic goals of federal agencies. What role does OSTP play in reviewing the strategic goals for civilian science agencies? To what extent has OSTP been involved with the implementation of the GPRA, particularly relating to those activities aimed at achieving national goals or involving multiple agencies?

Answer: OMB, OSTP, and the National Science and Technology Council work together to develop priorities for R&D directed to the attainment of national goals and to establish overall planning parameters. The NSTC provides a mechanism for general coordination and sharing of experience. OSTP plays an advisory role in OMB and agency planning decisions. Please note, OMB collects strategic plans; it does not approve them.

Question 7: The National Academy of Sciences has begun discussing using "science roadmaps" for establishing goals and bench marks for scientific research. What are your thoughts on this approach?

Answer: The NAS has begun general discussions on the use of "science roadmaps" to improve planning of the federal science research portfolio. The Academy's approach is based on the successful roadmaps designed for the industrial sector (e.g., Sematech). It is unclear at this time how this approach could successfully be applied to the diverse array of fundamental research programs supported by the federal government. For a roadmap to be useful, it must have a specific destination in mind (e.g., a new computer chip). With diverse areas of fundamental research, the end product (greater knowledge) is less specific, making the route much more uncertain. Nevertheless, some of the underlying ideas in the roadmap approach are applicable and are embodied in the strategic plan component of GPRA. Several disciplines, especially those areas of the physical sciences that involve large facilities, have developed very effective long-range plans. Such plans, which layout general scientific trusts of highest priority and the budget and facilities needed to pursue them, are the analog of roadmaps in fundamental science.

Teri.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

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AUG 29 1996

Committee on Science

The Honorable Robert Walker
Chairman
Committee on Science
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

Enclosed are the National Oceanic and Atmospheric Administration's responses to questions submitted in follow-up to the July 10, 1996 hearing on Civilian Science Agencies' Implementation of the Government Performance and Results Act.

Please do not hesitate to call me should you require additional information.

Sincerely,

Marlene Broutman for
Brian Wheeler
Director

Enclosure

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FOLLOW-UP QUESTIONS FOR DIANA JOSEPHSON
FROM A HEARING BEFORE THE COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES
JULY 10, 1996

Questions from Representative Robert S. Walker

QUESTION #1

Have you encountered conflicting stakeholder interests in the development of your strategic plan? If so, how have you resolved this challenge in order to reach consensus on goals and priorities?

ANSWER:
In an organization as functionally diverse and complex as NOAA, and given the differing interests of a wide range of stakeholders, there was not immediate agreement on the goals and priorities of the NOAA's initial Strategic Plan, developed in 1993. This healthy disagreement allowed us to have a lively debate concerning our future direction as we prepared the strategic plan. Because the first edition of the plan was developed and reviewed quickly over a 10 week period, NOAA recognized, and our critics agreed, that greater customer and stakeholder participation should be a primary focus when we updated the plan. During our latest update and revision of the strategic plan, conducted during 1994-1995, NOAA sought to involve customers and stakeholders more directly by soliciting the input of key external experts in drafting updated chapters of the plan, as well as by distributing these updated chapters to a much wider audience for their review and comment.

As a result, we believe that our customers and stakeholders feel more involved in the process and that they have played a part in the development of the goals and priorities of the NOAA Strategic Plan. Because we sought the buy-in of our customers and stakeholders, we reached an early consensus on our general goals. Through two iterations of NOAA's Strategic Plan, we have solicited the input and participation of our customers and stakeholders through workshops, meetings and the Internet. We will continue to seek such participation, not only because it is critical to building support and acquiring resources for our programs, but because it provides the means to identify and implement modifications to our plan which will keep it current and responsive to customer needs.

QUESTION #2

Since GPRA activities are primarily agency specific, how will NOAA adequately assess those activities that involve programs or

have broad benefits across many agencies or fields of science? How does NOAA assess its own performance when participating in performance partnerships? How are the agencies working together to address common GPRA implementation issues and establish consistent performance assessment methodologies?

ANSWER:
NOAA intends to use performance partnerships to proceed with its implementation of the Government Performance and Results Act (GPRA). By establishing partnerships with other agencies or entities, shared goals or outcomes become more achievable, and broader societal goals can be met, often in a more cost-effective manner. Although NOAA is currently engaged in developing intra-Departmental performance partnerships through the Department of Commerce's strategic planning effort under the GPRA, our mission success already depends heavily on inter-Departmental cooperation.

For example, NOAA works very closely with a number of other agencies at both the Federal and state level, private and public utilities, treaty tribes, and others in carrying out its Endangered Species Act responsibilities for salmon in the Columbia River Basin, as part of its Recover Protected Species goal. While NOAA has jurisdiction over part of the biological range of these stocks, other federal and state agencies have authority over many of the in-river activities which may impinge on these species and their habitat. Without effective partnerships with these other entities, NOAA's stewardship mission for these resources becomes much more difficult to achieve.

Similarly, the effective application of seasonal to interannual climate forecasts for the management of agricultural, water and energy resources will depend on performance feedback, both in terms of the match between models and observations, and with respect to how customers use the information. NOAA must work closely with other agencies including USDA, DOE, USGS, as well as our partners in the academic community, to ensure that resources are invested wisely and the information products can be utilized by customers.

NOAA is engaged in related partnerships with the private sector which influence how well we provide services and information to the public. For instance, weather and climate services are provided to the public and industry through a unique partnership between the NWS and the private meteorological sector. The NWS provides forecasts and warnings for public safety, and the private sector promotes dissemination of forecasts and the tailoring of basic information for business uses. This balance is a fundamental strength of the partnership, and has enabled the private meteorological sector to grow to an over $200 million industry.

Agencies are working together to address common GPRA implementation issues and establish consistent performance assessment methodologies through several interagency efforts such as the Office of Science and Technology Policy's Practitioner's Working Group on Research Evaluation and the National Science Foundation's interagency round table discussions. We are also working with the National Academy of Public Administration to promote the most effective implementation of the GPRA. In addition, through the National Science and Technology Council's Committee on Environment and Natural Resources, NOAA works with other federal agencies and non-governmental experts to design and prioritize the government's environment and natural resources research and development agenda. This interagency planning and coordination ensures the most effective application of available resources.

QUESTION #3

How do the bench scientists and research managers feel about performance assessment? How do you assure that performance assessment is valued and integrated into the organizational culture, rather than remain just a data collection activity?

ANSWER:
As was testified to at the hearing, bench scientists and research managers may feel that performance assessment, if done on a strictly quantitative basis, might have a stifling effect on research in general by diverting the focus from the best science to the measurements themselves. However, NOAA's bench scientists and research managers also understand that they support NOAA's mission by conducting research that is largely service-driven. NOAA believes that appropriate metrics (both qualitative and quantitative) are being designed to measure the value of the proposed science to achieving our mission goals.

For agencies whose fundamental mission is fostering basic scientific understanding, without an explicit service requirement, the best performance attribute may well be the quality of the research. Even if the guidelines for how the Nation chooses to support the types of basic research conducted are unclear or unspecified, it should be clear that we cannot afford to support poor quality research.

QUESTION #4

In implementing the accountability provisions of GPRA, program managers will naturally tend to emphasize what they can count and, perhaps what they think they can easily achieve. Will setting goals for science stifle creativity or risk-taking and encourage an overemphasis on outputs and outcomes that are

countable? How does NOAA assess the marginal benefit of investing incrementally in an existing field of science versus investing in a fundamentally new, but less predictable, scientific or technical endeavor?

ANSWER:
While we acknowledge that in the initial development of performance measures, some program managers may have identified easily attainable goals, we do not feel that this is a tendency that will continue. As the corporate culture matures, and as our managers get more sophisticated in applying the principles of the GPRA, performance measures will improve by becoming both more practical (e.g., feasible and sensible) and aggressive.

In practice, it is likely that the most successful approach to making progress toward strategic goals will depend on a proper balance of incremental and low-risk investment combined with aggressive, higher-risk endeavors. For some agencies, by virtue of their mission characteristics, the only supportable course will be the incremental approach. For others, aggressive strategies in association with responsible risk reduction activities may yield performance breakthroughs which easily justify the investment risk. For instance, the technological basis for NOAA's weather service modernization, including the development of new Doppler radars which have significantly improved lead times and accuracies for severe weather warnings, has been provided by NOAA's research and development capabilities. At the time, these R&D efforts were considered by some to be high-risk investments, yet NOAA was convinced that real performance improvements could only be attained with the application of advanced scientific understanding and revolutionary technology.

Rather than stifle creativity, the GPRA process should have an enlightening affect on goal-setting and encourage innovative efforts. NOAA judges proposed work, whether incremental advances of existing efforts or bold new endeavors, on the basis of how it contributes to the pursuit of our vision and our mission responsibilities.

QUESTION #5

Will the greater use of peer reviews stifle creativity by encouraging consensus and scientifically safe approaches? How do you ensure knowledgeable peer reviews that are also objective and lack conflicts-of-interest? While peer review may have the knowledge to evaluate the scientific merit of proposals, they probably lack the breadth to advise agencies on future R&D investment strategies. Should the research evaluation

methodology of peer review panels be modified to improve outcome prediction? Do you have any recommendations to improve the peer review process?

ANSWER:
NOAA is concerned with both the scientific validity and quality of a proposal and the priority of adopting that proposal for implementation. NOAA currently solicits and receives expert advice in the form of peer review of proposals and completed work for many program efforts, and we are working to improve how we utilize partnerships in developing future science strategies. Neither NOAA, nor the external scientific community, alone have the total required expertise to identify, design and cooperatively implement the research and development strategies which will help advance our strategic goals and position us to meet the challenges of the 21st century.

The validity and quality of a proposal can be determined during peer review. The potential of that proposal to have a positive impact on NOAA successfully accomplishing its mission may also be determined given clear guidelines. To be useful to NOAA, peer review panels must understand the purpose and context of the review: to identify proposals and research strategies that if adopted will have an impact on the mission. If this is understood and agreed to by all participants, conflict of interest should not be an issue. The more important question is whether external partners or reviewers would be willing and capable to perform this additional task of evaluating the proposed research in terms of desired outcomes.

QUESTION #6

How will performance information in GPRA be linked to or used in planning and budgeting for research? What will happen to a research program if it cannot meet its performance goal?

ANSWER:
The NOAA Strategic Plan details goals and objectives that will allow us to reach our vision for the year 2005. NOAA conducts its strategic planning and budgeting activities according to an annual cycle that allows the agency to plan, budget, and continuously verify and validate performance. From the Strategic Plan, our strategic planning teams create a 5-year Implementation Plan for each of the seven goals. The plans set the course for meeting our vision by identifying the work we want to do over the next five years to accomplish our goals, including the research requirements. Building on the Implementation Plans, the teams next develop budget initiatives based on our strategic goals. Budget requests are constrained by the five-year plans; if the activity is not identified in the plan, it cannot be put forward as a budget request. In developing the FY 1998 budget, NOAA took

its first steps towards performance based budgeting by identifying improved performance that would result from the initiatives. This process will further strengthen NOAA as a results based agency.

Performance measures provide a basis for accountability, including research. As a mission agency, NOAA is accountable for the quality of its services, and we depend on research for improvements in both services and scientific understanding. NOAA's goal to predict and assess decadal to centennial changes in the Earth's environment combines research, observations and assessments to improve the knowledge of climate change. Predictive capabilities developed through this goal may not be verifiable for ten years to decades. In the interim, outputs can be measured, but not outcomes. Since output measures do not adequately reflect results, qualitative measures are used to evaluate the quality of scientific information, its applicability to environmental policy decisions, and its utility to end users. For example, our environmental research laboratories are evaluating both the global warming and ozone depleting potentials of proposed substitutes for CFCs to facilitate the rehabilitation of the ozone layer while ensuring that viable replacements for CFCs do not contribute to global warming. This type of ■interim output■ information, peer-reviewed for quality, is crucial for decision makers faced with implementing policies for which the ■outcomes■ may not be known for decades. For a mission agency like NOAA, accountability in research is needed not only for planning and budgeting purposes, but to ensure the credibility of information which may be used to make decisions with significant economic and social consequences.

QUESTION #7

NOAA has encountered some resistance in its attempt to restructure its budget to reflect its strategic plan and incorporate some performance measurement information. Why has this resistance occurred and what steps are being taken to overcome it? What recommendations do you have to improve the performance budgeting process?

ANSWER:
Performance based budgeting as required by the GPRA represents a radical new way of thinking. It requires an organization to shift its focus from sustaining activities to achieving measurable results; these are not necessarily identical pursuits. This shift is not instantaneous and in fact can be slow. NOAA has hastened this transition by actively aligning teams along

strategic goals and managing accordingly, and by easing the transition to performance based budgeting by preparing accompanying budgets in both strategic terms and in the traditional, line organization structure.

There is a difficulty, not limited to programs within NOAA, managing programs that support multiple goals in a goal-based budget. Managers, customers, and stakeholders are most comfortable when they can see and identify traditional program activities (e.g., Sea Grant, Coastal Zone Management, etc.). They may feel that programs like Sea Grant, which supports multiple goals in the goal-based budget, tend to lose their identity when the budget is divided among the goals which the program supports. What is really important, however, is the contribution that Sea Grant makes in enabling NOAA to make progress toward its goals, irrespective of how its budget is portrayed. Similarly, major programs and budgets of multiple Line Offices may be combined to support a particular goal. For instance, the goal to Advance Short-Term Warning and Forecast Services incorporates most of the budget of the National Weather Service, the National Environmental Satellite, Data and Information Service, and nearly one quarter (22%) of the Office of Oceanic and Atmospheric Research. To focus on the requirements of the goal, the organizational structure tends to be subsumed.

As part of the annual budget process, NOAA has submitted its budget to the Congress for the past two years in both the strategic plan format and the organization-based format. This is an important mechanism for communicating with the Congress our GPRA efforts. In an effort to familiarize the Congress with our strategic planning perspective we have included a means for cross-walking between the two different formats as part of our Executive Summary of the budget. Because NOAA's performance measures depend on the cross-cutting application of programs and resources, and are not organizationally-bound, the strategic plan budget is the clearest means of showing how dollars will support performance. The transition to performance-based budgeting is facilitated when Congress looks beyond the boundaries of specific programs and focusses on goals. A revised budget structure would help translate strategic planning into expenditures that produce expected outcomes. For its FY 1998 submission, NOAA will again provide our budget request based on strategic goals.

QUESTION #8

As a "whole agency" GPRA pilot project, NOAA was selected as one of the exemplars by OMB during the initial pilot period. What aspects of NOAA's pilot project was OMB particularly pleased with?

ANSWER:
NOAA has received recognition from other agencies and from government oversight bodies on our strategic planning process. We have been cited by the National Academy of Public Administration and OMB as one of the ten best projects under the pilot phase of the GPRA. GAO, in its June, 1996, Executive Guide to "Effectively Implementing the Government Performance and Results Act," cites a subset of NOAA's performance measures as a case illustration of critical practices in implementing the GPRA. Other agencies have consulted extensively with us in designing their own strategic planning processes.

OMB used two criteria in selecting its exemplars from the FY 1994 GPRA Performance Measurement Pilot Projects:

1) Does the plan contain measurable goals, either output or outcome?
2) Do the goals generally correspond to the scope and nature of the programs and activities included in the pilot project?

OMB cited that NOAA's plan set out general goals for ten years in the future, and matched the annual performance goals with the long-term objectives. Goals were found to be quantifiable and referenced to a 1993 baseline. Intermediate outputs (such as satellite launches and hardware installation) were presented as resources and processes, not goals.

QUESTION #9

How do you expect the implementation of GPRA will effect your interactions with the scientific community, Congress, and the public?

ANSWER:
The move to results oriented management as mandated by GPRA should have a positive effect on the scientific community, Congress and the public. The scientific community will be aware of each agency's long term game plan and will be able to focus its support efforts and proposal generation more directly. NOAA is working with its university partners and professional associations to improve universities' access to, and participation in, the NOAA strategic planning process.

By implementing the GPRA, agencies will have an opportunity to describe to the Congress their vision, mission and goals for the future, and how these goals will support the business of government. Through evaluating performance information, the Congress will be in an improved position to target funds to the areas where they will have the most impact.

For the public, the GPRA provides a vehicle for accountability; a contract between taxpayers and federal agencies. This important law is designed to improve the performance of public agencies, and the communication of, and accountability for, long-term goals, responsibilities and resource requirements. NOAA has worked to achieve widespread buy-in to its strategic plan, both internal and external, including our primary customers, the U.S. taxpayer.

QUESTION #10

What do you think are the primary benefits of GPRA for the NOAA? What are the costs of implementing GPRA? Do you think the benefits of GPRA will outweigh the costs?

ANSWER:
Because of GPRA, NOAA has shifted its management orientation to:

- think strategically over the long term versus the short term;
- think in terms of measurable results versus activities;
- think in terms of value added, impact, and effectiveness; and
- recognize change is necessary and accept that Government management cannot continue as in the past.

NOAA does not believe that the implementation of GPRA will entail greater costs to the agency since we view the provisions simply as good business practices that should be implemented. We have made significant investments in both time and talent to develop our plan and to conduct the annual strategic planning process, but this has been done by including strategic planning support as part of the annual performance plans of managers and workers. There will always be costs to conduct agencies' planning, management, budgeting, evaluation and reporting functions, but NOAA believes that the GPRA approach to these functions constitutes a better way of doing business, not necessarily a costlier way.

The development of the NOAA strategic plan has allowed us to establish a clear vision of where we would like to be in 2005, and has provided the means to make the programmatic and budget decisions necessary to achieving that vision and the basis for assessing our progress in reaching our goals. These are tremendous benefits.

Responses to Additional Questions:
CIVILIAN SCIENCE AGENCIES' IMPLEMENTATION OF THE GOVERNMENT PERFORMANCE AND RESULTS ACT
from the National Science Foundation

Question 1: Have you encountered conflicting stakeholder interests in the development of your strategic plan? If so, how have you resolved this challenge in order to reach consensus on goals and priorities?

> Because of the major effort we have spent in consulting with stakeholders, especially on the National Science Board, we have had very few and minor conflicts in stakeholder interests in developing our strategic plan. We have consulted with representatives from the academic research and education communities and various portions of the private and public sector R&D and education communities. An initial version of the GPRA strategic plan is available on the World Wide Web and has been widely circulated in a print copy among the executive and legislative agencies of the Federal government. However, we expect stakeholder interest to become more intense in later phases of GPRA implementation, as the connection to budget increases.

Question 2: Since GPRA activities are primarily agency specific, how will the NSF adequately assess those activities that involve programs or have broad benefits across many agencies or fields of science? How are the agencies working together to address common GPRA implementation issues and establish consistent performance assessment methodologies?

> NSF components of interagency programs will need to meet the same performance standards as other NSF programs. The interagency programs themselves are subject to assessment by the Office of Science and Technology Policy. Many of the benefits of NSF programs are experienced by other agencies. These are included among the standard outcomes we will identify in our assessment procedures.
>
> NSF has worked with other agencies in a number of ways to address GPRA implementation and methodological issues. NSF staff were major contributors to the discussions and the preparation of the report, " Assessing Fundamental Science," issued by the Subcommittee on Research of the Committee on Fundamental Science of the National Science and Technology Council in July, 1996. NSF staff have participated actively in the discussions of the "Research Roundtable," an informal interagency group of individuals involved in GPRA implementation in Federal R&D organizations and agencies. NSF has also

organized a number of seminar discussions on methodological questions related to program performance assessment for research. Staff from the Office of Policy Support interact frequently on an informal basis with counterparts in other agencies and organizations on GPRA issues relating to research programs.

"Assessing Fundamental Science" stresses that one size does not fit all agencies when it comes to performance goals and indicators. In that spirit, NSF has developed its own responses to GPRA based on information about both the state of the art in research performance assessment and the practices of other agencies.

Question 3: How do bench scientists and research managers feel about performance assessment? How do you assure that performance assessment is valued by and integrated into the organizational culture, rather than remain just a data collection activity?

At the project level, performance assessment has been a central feature of the way NSF does business throughout its history. For research projects, renewal of funding depends on what the research team produced with the existing grant according to a panel of expert peers. For research centers and facilities, annual reports are required and each center and facility is subject to intense scrutiny every three years in order to determine what, if any, funding will be forthcoming and the conditions for this funding. Education and training programs have long stressed program design and project selection to produce results. Thus results orientation is already a part of NSF's organizational culture.

Program staff have gradually been drawn into NSF's discussions on formal GPRA implementation. The two major GPRA-related projects now underway – redesign of project reports and redesign of the Committee of Visitors process – have been received enthusiastically by program staff. NSF has also for past two fiscal years used administrative performance indicators to allocate a small portion of salaries and expenses funds among the major programmatic units of the Foundation. This process has sharpened the awareness of Foundation staff to the importance of a high level performance with regard to administrative objectives.

Question 4: In implementing the accountability provisions of GPRA, program managers will naturally tend to emphasize what they can count and, perhaps, what they think they can easily achieve. Will setting goals for science stifle creativity or risk-taking and encourage an overemphasis on outputs and outcomes that are countable? How does NSF assess the marginal benefit of investing incrementally in an existing field of science versus investing in a fundamentally new, but less predictable, scientific endeavor?

NSF has explicitly recognized the danger in over-reliance on quantitative performance goals in activities oriented toward creativity and risk-taking. The available measures do not adequately capture the core qualities we seek in research outcomes. We therefore plan to focus on descriptive performance goals, assessing progress using a mixture of descriptive and quantitative indicators, especially in our research programs. Another important step in this direction is to focus attention on the performance of portfolios of activity, rather than on individual projects.

To assess the marginal benefits of investing incrementally in an existing field of science versus investing in fundamentally new, but less predictable, scientific endeavors, NSF relies heavily on information and expert judgments provided by numerous independent sources, e.g., advisory committees and conferences on state-of-the-art research and research opportunities. NSF considers investment in emerging areas to be an essential part of its mission, and therefore assumes that it will have to forego some opportunities to advance the state of the art in existing fields in order to make resources available for innovation.

Question 5: How will performance information in GPRA be linked to or used in planning and budgeting for research? What will happen to a research program if it cannot meet its performance goal?

Decisions about investment strategies at the National Science Foundation ultimately rest on the informed judgment of management. Performance information is now used as one of the inputs to resource allocation decisions, and will continue to be used as GPRA is implemented. When a program shows weak performance in relation to a standard, or has not met a stated goal, management will analyze the factors that contributed to the weak performance, and either change strategy or conditions to improve performance or move resources to other program areas.

Question 6: NSF is emphasizing qualitative and "alternative" approaches to assess the performance of agency programs. Describe the approaches that you are considering. How can you tell if a program is failing or succeeding when using non-quantitative assessment?

NSF is translating the goals and strategies of its strategic plan into a set of performance goals and standards for programs. Some of the goals are quantitative and some are descriptive. For example, NSF-supported research facilities must complete construction and upgrades on-time and on-budget, within tight standards; these goals are quantitative. NSF research programs, however, should produce world-class contributions to the science and engineering knowledge base; this goal is qualitative. For each qualitative goal we set, we will provide a description of minimally effective performance and a description of successful performance, as specified in GPRA. We will also indicate data sources that provide information relevant to judging the level of performance.

We then plan to ask expert panels with broad representation from producer and user communities to provide us with assessments of performance on the relevant performance standards, using both quantitative data and their own experience with the field in question. Management will use the assessments as one input that informs their treatment of the activity in question. The purpose of the assessment is not to make a pass-fail decision but rather to produce information that identifies areas where program management needs to be improved or where investment is yielding relatively lower levels of progress toward the Foundation's goals.

Question 7: Will the greater use of peer review stifle creativity by encouraging consensus, scientifically safe approaches? How do you ensure knowledgeable peer reviewers that are also objective and lack conflict-of-interest? While peer reviewers might have the knowledge to evaluate the scientific merit of proposals, they probably lack the breadth to advise agencies on future R&D strategies. Should the research evaluation methodology of peer review panels be modified to improve outcome prediction? Do you have any recommendations to improve the peer review process?

NSF is proposing to use independent assessment panels as one aspect of its GPRA response. These panels will be operate quite differently from the peer review panels that choose prospectively among competing proposals. First, instead of selecting among proposals and giving verbatim feedback to investigators, they will examine portfolios of activities retrospectively, with feedback to program managers. Thus, the potential for stifling creativity is much less.

Second, they will be constituted differently. These panels must consist of individuals who are knowledgeable enough about the field in question so that their assessments are credible, with both the research community and other stakeholders. However, they must avoid actual and potential conflicts of interest. The broader the area evaluated, the easier this goal is to achieve. We intend to rely heavily on researchers from industry, other government agencies, and other countries in composing the panels. The members of the panels must also be chosen for their breadth of experience and perspective, because they have the essential job of interpreting and evaluating output indicators and reports of accomplishments provided by grantees. In organizing the panels' efforts, NSF will draw on the state of the art in research performance indicators and assessment processes, including careful statements of the performance standards by which the activity should be assessed and a solid base of information to inform the assessment.

Question 8: What is a good output measure for basic research? What would you consider a good outcome for basic research?

There is no single good output measure for fundamental research. A mix of measures must be used. Publications in peer-reviewed journals are the most universal output, but books, computer programs, instruments, and other products are also important. People – who represent national capacity to take advantage of new research knowledge – are the most important product of research activity.

> Good outcomes for fundamental research depend on the mission and goals of the agency sponsoring the research. For NSF, good outcomes include contributions to advancing knowledge in a broad spectrum of scientific fields, enduring and productive partnerships with organizations that use research knowledge and personnel, and contributions to education.

Question 9: NSF has historically allowed program managers some discretion to award funds for lines of inquiry that they feel are especially promising. Will this change under GPRA?

> Although we expect processes and decisions to change as a result of GPRA-inspired information gathering, the discretion allowed to program officers to fund promising lines of inquiry which we commonly refer to as "risk taking" will not change.

Question 10: How do you expect the implementation of GPRA will affect your interaction with the scientific community, Congress, and the public?

> We expect GPRA to increase the involvement of the scientific community, the Congress, and the public in various ways. For example, NSF will consult with major science and engineering stakeholders and individuals representing Congressional interests in the preparation of the strategic plan. NSF will rely on expert panels from the science and engineering community to judge NSF performance in relation to the goals and objectives spelled out in the annual performance plans. NSF will regularly seek the views of grantees on how well the organization performs in providing them with various services, e.g., processing of proposals and awards and providing information about NSF programs and activities.

Question 11: What do you believe are the primary benefits of GPRA for the NSF? What are the costs of implementing GPRA? Do you think the benefits of GPRA will outweigh the costs?

> The requirement for a comprehensive and integrated set of performance goals for the agency as a whole is expected to assist NSF management in a number of ways. NSF management will have more comprehensive information about program outputs and outcomes which will help in planning for future programs and in communicating what is expected from and being accomplished with the NSF budget. Overall performance goals for the agency will provide program officers with a sharper perspective on what individual programs are supposed to accomplish. With an integrated and comprehensive long-term strategic plan, an annual performance plan, and annual performance reports, NSF will also be able to communicate more effectively about its program and accomplishments with its stakeholders.

The major cost in implementing GPRA at this point is staff time. We expect the benefit/cost ratio to rise as our revised systems are put into place and the law itself goes into full effect. We are concerned about costs and are committed to ensuring that the costs of implementing GPRA do not outweigh the benefits.

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

Reply to Attn of LB:MDD:L96-581f/588f

AUG 6 1996

Honorable Robert S. Walker
Chairman
Committee on Science
House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

Enclosed is the edited transcript resulting from the July 10, 1996, hearing at which Mr. Gary Steinberg testified concerning the Civilian Science Agencies' Implementation of the Government Performance and Results Act. Also, enclosed are the responses to written questions forwarded by your letter of July 17, 1996.

Sincerely,

Mary D. Kerwin
Deputy Associate Administrator
for Legislative Affairs

Enclosure

Responses to written questions submitted by Cong. Walker resulting from the July 10, 1996, hearing.

QUESTION 1:

OMB considers the NASA strategic planning process to be exemplary. What were the aspects of NASA's strategic planning process that OMB particularly liked?

ANSWER 1:

There are a number of aspects of NASA's strategic planning process that OMB and OPM have praised.

a) Our Plan was developed under the direction of the NASA Administrator by the Agency's Senior Management Group to define the future for the Nation's civil aeronautics and space program. It was developed using a series of highly interactive and collegial senior management retreats.

b) The Plan reflects inputs from our customers, stakeholders, and the NASA workforce, and defines NASA's vision, mission, and goals. In addition, the Plan delineates implementation strategies and key decision rules for determining our priorities.

c) The cornerstone of the Strategic Plan is a Strategic Framework based on customer-focused Strategic Enterprises (Mission to Planet Earth, Aeronautics, Human Exploration and Development of Space, Space Science, and Space Technology), crosscutting processes, and a set of strategies intended to revolutionize NASA . Our Strategic Enterprise approach has helped the Agency ensure that our goals, objectives, and programs produce valuable and relevant products and services for our customers.

QUESTION 2:

Have you encountered conflicting stakeholders interest in the development of your strategic plan? If so, how have you resolved this challenge in order to reach consensus on goals and priorities?

ANSWER 2:

Although NASA has made significant progress in the areas of strategic planning and performance evaluation, further challenges are ahead. Obtaining consensus on the future direction of the Nation's aeronautics and space program, and establishing meaningful performance assessment measures for our products and services have not been easy tasks.

As part of early deliberations with our customers and stakeholders we were faced with the realities of conflicting interests between the space science, earth science, human exploration, and aeronautics communities. Given the mandates of the Space Act of 1958 and NASA's new 3-part mission, we were able to reach a consensus with our stakeholders that it was necessary to maintain a balanced program of space and earth science, human exploration, and aeronautics within the Agency. Although not all areas of focus receive equal resources, the majority of our stakeholders now agree that a presence in each area is appropriate.

QUESTION 3:

NASA has developed a FY 1995 performance plan as an internal pilot. What have you learned from this internal pilot?

ANSWER 3:

We recognize that NASA must continue to develop top-level Agency/ Enterprise performance metrics, which will be used to assess performance against the goals and objectives stated in all our plans. NASA developed its internal pilot Performance Plan for FY 1995 and reviewed it with the NASA Advisory Council, OMB, and Congressional staff. The suggested recommendations and improvements to these metrics have been included in a Performance Plan for Fiscal Year 1996, which will be released shortly. These metrics have also been included in the Agency's FY 1997 budget request and our Chief Financial Officer's Fiscal Year 1995 Accountability Report. The development of our internal pilot performance plan caused NASA to work with our customers to identify meaningful output and outcome oriented metrics. Output measures include measures of spacecraft costs, development time for flight projects, and launch rates for NASA's space science and Earth observation programs. Outcome measures include effectiveness indicators for activities associated with generating new knowledge, communicating knowledge, producing new technologies, and helping new technologies reach the commercial marketplace.

Some of the challenges in developing metrics for research and development goals identified as a result of our internal pilot are as follows:

a) The discoveries, innovations, and new knowledge resulting from NASA's research and development programs do not normally become available until several years after the programs are initiated. In space science, for example, the Galileo mission is providing extraordinary new insight into Jupiter, however, the mission was launched in 1989. The same latency effect also applies to our aeronautics programs. New technologies developed by NASA in the 1980s to support the advancement of commercial aviation have been applied recently to new commercial aircraft provided by industry.

b) NASA cannot necessarily predict the outcomes of basic research programs. For example, two of the most spectacular discoveries made last year by the Hubble Telescope--the formation of new stars and a Jupiter-like planet in another solar system--were not planned outcomes of the Hubble program. These discoveries, however, have provided tremendous new knowledge about the universe around us.

c) NASA is not often in direct control of the outcomes of our research and development programs. For example, we can make cutting-edge new technologies, systems, and processes available to industry and other Government agencies, however, we cannot influence how they use them. We can make exciting new information about space and air travel, our planet's changing environment, the Moon, the Sun, and the universe around us available to teachers and students across America; however, we cannot prescribe how this information is used in the classroom. The same holds true for the data and information we make available to the science community and the general public.

QUESTION 4:

Since GPRA activities are primarily agency specific, how will NASA adequately assess those activities that involve programs that have broad benefits across many agencies or fields of science?

ANSWER 4:

a) NASA is working with other Agencies to establish broad metrics that can be used to assess performance on our cooperative programs. For example, we are working with NOAA and others in the earth science area to develop common metrics that can be used to assess our collaborative contributions to our customers in the academic and science communities and the public.

How are the agencies working together to address common GPRA implementation issues and establish consistent performance assessment methodologies?

b) NASA and other Federal research and development organizations still face significant challenges to develop meaningful output and outcome metrics to assess performance and communicate results. NASA is working with other agencies, in forums such as the National Academy of Sciences, the National Science and Technology Council, and the Interagency Research Roundtable to share ideas and concepts in the area of performance metrics. Through our participation in these forums, our internal performance planning activities, and our ongoing dialogue with the NASA Advisory Council, the Administration, and Congress, NASA is confident we will be prepared for the formal implementation of the Government Performance and Results Act in September 1997. We will achieve goals and objectives that are consistent with the Nation's priorities in research and development.

QUESTION 5:

How do the bench scientists and research managers feel about performance assessment? How do you assure that performance assessment is valued by and integrated into the organizational culture, rather than remain just a data collection activity?

ANSWER 5:

Performance assessment, in its current form, is not all that different from the progress reports working engineers and scientists already provide; what is being measured is different, but the need to measure success is the same. To ensure that performance assessment becomes institutionalized into the culture of NASA and NASA-related researchers will take time.

Nevertheless, the process of educating both NASA and non-NASA researchers is already underway. NASA's Office of Space Science (OSS) is currently conducting a comprehensive review (expected to take 18 months) of our grant solicitation and award process. Initiated following the reorganization of OSS (in which we combined three science divisions into one), this process action team (called the Research Administration Process or RAP Team) has been active for the last 6 weeks. One of the items this team is preparing is a guidebook for the science community that will explain NASA's grant solicitation and award process. This guidebook will be updated as the RAP Team completes its Phase II (NRA Proposal Processing and Peer Review) and Phase III (Announcement of Opportunities Streamlining) activities, providing researchers with a clearer understanding of NASA's priorities and processes for grant solicitation and award. The first version of this guidebook (covering Phase I activities only) should be available by early 1997, and will be updated and expanded, as necessary, after that.

QUESTION 6:

In implementing the accountability provisions of GPRA, program managers will naturally tend to emphasize what they can count and, perhaps, what they think they can easily achieve? Will setting goals for science stifle creativity or risk-taking and encourage overemphasis on outputs and outcomes that are countable?

ANSWER 6:

If done properly, setting goals for science will not stifle creativity. NASA's space science program uses three metrics for measuring the success of the scientific component of its missions: 1) measuring the number of scientific papers that are published in refereed science journals that result from NASA data (measures the output of scientific disciplines), 2) measuring how often discoveries made possible by NASA missions are included in the Science News annual survey of noteworthy scientific discoveries (measures importance of discoveries across science disciplines and how well they translate into public understanding of science), and 3) measuring the impact of NASA-related discoveries on the content of introductory astronomy textbooks (measures how well discoveries impact the broader education system). These measures are not controllable by NASA program managers, but rather rely on independent external review of the results of our missions. Creativity is actually enhanced by the use of these metrics because researchers must focus on more than just publishing research papers to be deemed a success. Their areas of research must become more tailored toward discoveries that will be significant enough to translate beyond the scientific community into the larger educational system and to the general public.

b. How does NASA assess the marginal benefit of investing incrementally in an existing field of science or technology versus investing in a fundamentally new, but less predictable, endeavor?

NASA always strives to maintain a balanced approach to our programs -- understanding that a mix of research programs is necessary for overall scientific success. As part of a balanced program, we maintain programs that are exclusively dedicated to the most innovative technology and science. NASA's innovative research program (one of our most oversubscribed programs in Space Science) is just one example.

NASA also uses our standing advisory groups to continuously review ongoing missions and to advise us on the balance between marginal advances and fundamental advances in our strategic planning. We also conduct special periodic peer reviews of operational programs to assess their relative scientific merit vis-à-vis planned missions or missions under development.

QUESTION 7:

Will the greater use of peer review stifle creativity by encouraging consensus, scientifically safe approaches? How do you ensure knowledgeable peer reviewers that are also objective and lack conflicts-of-interest? While peer reviewers may have the knowledge to evaluate the scientific merit of proposals, they probably lack the breadth to advise agencies on future R&D investment strategies. Should the research evaluation methodology of peer review be modified to improve outcome prediction? Do you have any recommendations to improve the peer review process?

ANSWER 7:

If done properly, increased peer review should not stifle creativity. While this system demands rigor and competency, it has shown itself to be flexible enough to accommodate a wide range of theories, including ideas that may be labeled "unconventional" or "daring." Nevertheless, we are well aware of these concerns and we are proactively taking steps to ensure that peer review does not negatively impact creativity. As mentioned above, NASA has programs that are exclusively dedicated to the most innovative research, ensuring that a portion of our research funds are exclusively dedicated to this important research; in addition, all of our research programs are being encouraged to highlight these concerns. A joint External-NASA team (chaired by Dr. Berrien Moore III, University of New Hampshire) in assessing the OSS peer review process last Fall concluded that: "We do not find any evidence that peer review stifles innovation." They did, nevertheless, recommend that "the Panels and mail reviewers be reminded of the concern that innovative research does not fare well in peer review, though we did not find any basis for this concern." OSS is working to ensure that our review panels get the message on this important concern. A copy of the Team's complete conclusions and findings (dated October 24, 1995) is enclosed for your information.

We in NASA work hard to select the best possible reviewers for our panels. We avoid potential conflicts of interest by assuring that no proposers serve on the panel reviewing a set of proposals that includes their own. In addition, we have implemented independent checks and balances to ensure that panels are not unduly influenced. For example, NASA uses standing review panels for reviewing proposals in solar system exploration, but they also use independent mail-in reviewers that vary from review to review to ensure fresh independent assessments of the scientific merit of the proposals under review. Standing panel members must recluse themselves if they have an interest in the solicitation (NASA Research Announcement (NRA) or Announcement of Opportunity) e.g. if they plan to propose.

Further, we strive to have a mix of applied technologists and strategic thinkers as well as applied and theoretical scientists on our selection panels and our advisory committees. Our approach is to maintain a broad hierarchical advisory structure, as well as outside advice from the National Academy of Sciences, to ensure that the advice we get is balanced and can be properly utilized in the development of our long-range strategic planning.

As mentioned above, NASA's Office of Space Science (OSS) is currently conducting a comprehensive review of our grant solicitation and award process. One of the inputs that Research Administration Process or RAP Team is reviewing is the results of the joint External-NASA review of the OSS peer review process (chaired by Dr. Berrien Moore III and mentioned above) that was conducted last Fall.

We anticipate that the RAP Team will complete its review of Phase I activities (NASA Research Announcement drafting and release/community submission of proposals) by the end of 1996, and will then turn to its review of proposal processing and peer review (Phase II) in early 1997. They will be reviewing how we best can implement the advice from the group chaired by Dr. Moore and others, within a reorganized OSS where all Space Science NRAs now will be issued from just one division. Given that there were three similar, but not identical, approaches to issuing and processing NRAs in the previous OSS organizational structure, we are striving to identify how we might further streamline and standardize the new Space Science grant solicitation and award process. As part of their Phase II activity, the RAP team anticipates meeting with the National Science Foundation (NSF) and the National Institutes of Health (NIH) to benchmark best practices in their grant solicitation and award process. We anticipate that the RAP Team's review of the OSS proposal processing and peer review will be complete by mid-1997. We would be happy to brief the Committee on the Team's findings when they are available.

QUESTION 8:

How do you expect the implementation of GPRA will effect your interactions with the scientific community, Congress, and the public?

ANSWER 8:

We expect that this implementation will strengthen our interaction with all three groups. The scientific community interested in proposing to NASA grant programs knows and understands our selection process. Implementing the GPRA will help them to understand the need to ensure that their results reach beyond their fellow scientists into the broader educational and public community.

Implementing the GPRA, especially performance assessment, will help NASA explain and quantify the results of our research and technology missions to the Congress, educators, and the general public. It forces us to be more accountable to the American taxpayers, and to better explain how what we do impacts the broader community.

QUESTION 9:

What do you believe are the primary benefits of GPRA for NASA? What are the costs of implementing GPRA? Do you think the benefits of GPRA will outweigh the cost?

ANSWER 9:

The primary benefit of GPRA is that it has further reinforced the need for NASA to interface with our stakeholders and customers to fully understand their requirements. In addition, the Act provides NASA a forum to communicate the exciting results of our programs with the Congress, Administration, and the American public. In the months ahead, we will engage in further consultation with the White House, the Congress, OMB, other agencies, as well as our customers, stakeholders, and employees to fine tune our Strategic Plan and update the Enterprise Plans. We will comply with the GPRA directive for "Congressional consultation." At this point, NASA does not anticipate additional resource requirements or other costs associated with the formal implementation of GPRA. The costs associated with strategic planning, performance planning and evaluation, in NASA's view, are necessary to help the Agency continue to improve in the area of strategic management and would have been allocated regardless of GPRA requirements.

QUESTION 10:

How will performance information in GPRA be linked to or used in planning and budgeting for research? What will happen to a research program if it cannot meet its performance goal.

ANSWER 10:

At the individual program level, NASA assesses developmental stage program performance by reviewing performance against baseline cost, schedule, and technical requirements. In those situations where difficulties occur that would indicate failure to meet 90% of the cost, schedule, or technical goals, a program cancellation review is conducted. Programs that can remain within this cost and schedule threshold and support baseline technical requirements are continued. Programs that will exceed this threshold may be subject to cancellation.

This should not be construed to imply that NASA plans for 90% success on its programs. In the area of performance evaluation we are making very good progress. At the program level, reviews are conducted throughout the life of the program to confirm compliance with cost, schedule, and performance targets. These reviews also continually reaffirm that the outcomes of our programs remain relevant and provide valuable contributions to the Nation's needs. As a result of improvements in our program/project management system, which include the NASA Program Management Council's annual review of all major programs, we are conducting our programs with an improved focus on cost. Since the GAO Report of 1993, we have gone from a median cost overrun on our major programs of 77 percent to an average underrun of 5 percent on our current programs.

QUESTION 11:

NASA intends to move towards generating its budget on a full cost basis. How will this be impacted by GPRA?

ANSWER 11:

NASA is moving toward full cost accounting to enhance evaluation of program and enterprise performance. GPRA represents another catalyst that will allow the Agency to better assess performance against customer requirements. Accordingly, we view GPRA as complementary to our full cost accounting initiative.

QUESTION 12:

Will the proposed downsizing of NASA Headquarters impact the agency's ability to carry out the requirements of GPRA?

ANSWER 12:

As part of NASA's restructuring activities, we have concluded that Agency and Enterprise-level strategic and performance planning are Headquarters functions. Program execution and continuous evaluation activities must take place at the Centers, where program work gets done. The downsizing of Headquarters will require the Agency to identify a minimum number of key metrics that will enable the Agency to assess performance and report the results of Agencywide and Enterprise specific activities in the most efficient manner. Accordingly, the downsizing will also require increased cooperation between Headquarters and the Centers in the areas of performance planning, data collection and analysis, and performance reporting. Given the aforementioned roles and responsibilities, we do not anticipate that the downsizing of Headquarters will impact the Agency's ability to implement GPRA in any way. In fact, we believe that the implementation of GPRA will help facilitate increased cooperation between Headquarters and the Centers.

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BMIII-616
October 24, 1995

Dr. Wesley T. Huntress
Associate Administrator for Space
Science
Code S
NASA Headquarters
Washington, D. C. 20546

Dear Wes,

On 6 - 7 September 1995, the Peer Review Process Team met to assess the current status of peer review within the Office of Space Science (Agenda and Participants attached). We recognize that peer review is fundamental to this country's scientific program and that any review of this topic is, by definition, important and challenging. Given the premiere position of NASA in space science and our position as representatives of the space science community, this review assumed added importance. We have sought insight in the assessment, fairness in our proceedings, and clarity in our findings; these are also hallmarks of a successful peer review system.

Peer review is a specific process within an overall system of allocating research funds, from the NASA Research Announcement (NRA) release to arrival of funds. Peer review is, however, also used to mean this entire process. We recognized both aspects in this study and considered both specific aspects of the actual peer review process as well as the systemic characteristic of research funding. With regard to this broader viewpoint, it is important to recognize that the end-to-end allocation system for research funds involves more than one Code and much of it would be outside the literally defined boundaries of the process of peer review. Finally, we did not consider another area of peer review: namely Announcements of Opportunity. This is an important topic and should be considered in the future.

This evaluation, like the peer review process, is not only important, it was also difficult. Aspects of the process of peer review are subtle and complex. Fortunately, we had help; our deliberations were greatly aided by contributions from three science managers representing the Astrophysics, Solar System Exploration, and Space Physics Divisions: Guenter Riegler, Henry Brinton, and Mary Mellott, respectively. In addition, Carrie Sorrels contributed significantly to our proceeding by summarizing results from the recent survey, part of the Administration's Re-inventing Government effort, of the Peer Review System in the Office of Space Science (OSS) and by clarifying administrative aspects of the overall granting process.

Our findings and advice follow.

Current State
Fairness in the process and quality of the resulting science are the primary concerns in a Peer Review Program. This follows naturally from the peer review process since scientists, dedicated to their fields of expertise, determine priorities. We believe that peer review is the best method for achieving the highest quality science. In times of limited resources, peer review is evermore important to the scientific community and to science. Like democracy, peer review will never be a flawless system, but instances in which it is absent often lead to unfortunate results.

In the Office of Space Science, we find that the process of peer review is sound. It is not perfect, and it can be improved on the margins. Any changes, including those that we suggest, must be approached carefully. However, as competitive pressures and community stresses continue to rise, we must seek to insure the quality of our system of peer review and, as necessary, to refine it so that it remains robust to identification and selection of the highest quality research possible. Such a system will be characterized by multiple level checks and balances and by a high degree of visibility and accountability. The specific suggestions below are provided as a partial guide to improving and refining the process of peer review within the Office of Space Science and thereby within the broader scientific and engineering community within NASA.

Finally, we recognize that there are differences in process among the current Divisions in the Office of Space Science. We note that the impending reorganization of OSS presents an opportunity to re-examine the merits of a uniform process for peer review in the Office.

Panels And Mail Reviews
Panels coupled with significant mail reviews provide the most balanced peer review. The experience of the Solar System Exploration Division has shown that Standing Panels with publicized, rotating membership provide excellent community involvement and an increased sense of ownership of process and outcome. Mail reviews further involve the broad community and contribute vital information when the breadth of the subject matter is greater than that encompassed by the panel members.

There is a concern about dominance of the primary reviewer, and this concern is heightened by our recognition of the reality of the heavy workload in the current peer review system. An adversary atmosphere should be encouraged, in which the primary reviewer is expected to defend his or her statements, and the other panel members are encouraged to question and challenge the reviewer. Perhaps the concept of primary reviewer and alternative reviewer should be abandoned and replaced with a process of simply assigning two reviewers to each grant, each with full access to the mail reviews.

The combination of mail and panel reviews contains several, important checks and balances, given that thorough discussion occurs at the panel level and that mail reviews from discipline experts are taken thoroughly into consideration. Standing panels with rotating membership provide continuity and corporate memory. Detailed, technical evaluations by (multiple) mail reviewers provide a sound basis for group discussion by the panel (most of whom will lack detailed technical expertise in most proposals); moreover, the mail reviews can be used by panel members for evidence of personal bias (favorable or unfavorable). Open discussion of the overall importance and impact of the work at the panel level, in which all panel members play an active role, mitigates the undue influence of any individual mail or panel reviewer and provides a sound basis for final funding decisions by the program managers. Subsequent, smaller group discussions between panel group leaders and the program manager allow panel recommendations to be interleaved and ranked as a whole. A new step towards closure, that would increase visibility and accountability but which is not currently part of most programs, would be a presentation by the program manager to the panel group leaders of the funding decisions and the rationale for them before they became final. The incorporation of open discussion at all levels and stages diminishes the opportunity for judgement calls by any single individual to unduly influence the process.

For this system to function best, mail and panel reviewers should more clearly understand the roles they are expected to play. Vague reviews, either positive or negative, are of no use. Perhaps some feedback could be provided to mail reviewers by; for instance, the group chiefs, as to the usefulness of their reviews (The issue of roles and reviews is discussed further in § **Criteria and Communication**).

Finally, proposers wishing to appeal decisions should have access to all relevant information on which decisions are reached - including mail and panel reviews.

In summary, we suggest, where appropriate, the use of Standing Panels with mail reviews. We note that the primary and secondary reviewer concept could lead to dominance of one reviewer and observe that the Office of Space Science should explore the possibility of assigning two primary reviewers to each proposer, each having full access to the relevant mail reviews.

Fairness and Quality

For peer review, quality is paramount. Based on fairly detailed breakdowns presented to us, it appears that the time allocated to the period between the release of the NRA and the final deliberations of the review panels is reasonable. It is neither "cost effective" nor "science effective" to shorten the science evaluation portion of the overall process. As stated, we are troubled about conflicting pressures on the existing system, e.g., to reduce effort while maintaining quality. The quality of the scientific results should be the foremost consideration and should not be compromised by a reduced effort.

We do believe that the end-to-end time (from NRA release through grant procurement) for the NRA process can be shortened, and we are greatly encouraged by the stated objective of 2 months for the procurement process. Meeting this objective will significantly improve the total quality of the overall process -

Fairness and the perception of fairness are aspects of quality peer review; they are central to community participation in and support of the outcome of the peer review process. In general, this community acceptance will be more easily achieved if conflicts of interest, real and perceived, are minimized. An active leadership role of Centers in the peer review process may be viewed as a conflict of interest by the community

To summarize, we find that the quality of the system is central and that the current length of time for the science evaluation portion of the overall process is reasonable and consistent with preserving quality. We strongly support a two-month limit for the duration of the procurement phase. We find that fairness and the perception of fairness are central to maintaining community support and advise NASA to avoid even the appearance of a conflict of interest in conducting peer review.

Criteria and Communication

There is dissatisfaction with the peer review process in parts of the space science community, and this dissatisfaction centers on and results from poor communication. A specific complaint is that often the debriefings, supplied by the Panels, focus upon minor problems in the science or methodology rather than on the issues that actually determined the Panels recommended action. Similar concerns were expressed about the communication with program managers.

In a similar vein, great care should be applied to the development of clear, effective guidelines, which are then communicated to mail reviewers, panel members, and proposers alike. Substantive, accurate, civil written reviews and comments should be returned to the proposers where appropriate. We recognize that communicating spurious comments is not helpful and should be avoided. We further understand that the workload places limits on what can be achieved. Again, the core of the communication from NASA following peer review should state clearly the rationale and basis for the action; this communication should not be regarded as a vehicle for teaching grantsmanship

Clear communication must begin at the beginning. The scope, criteria, and relevance of the program must be clear in the NRA. Redundant and even contradictory information has been a problem. The NRA should state more clearly the rationale and criterion for judging proposals. We believe that an important criteria is *the impact on the field* of the proposer's recent and proposed work. If this is a criteria that is clearly stated in the NRA, then addressing this issue directly in the proposal is a necessary, but not sufficient, condition for success. In this regard, we disagree with the survey (that was conducted as part of NASA's response to the activity of "Re-inventing Government") recommendation of blind reviews. Citations and past program performance reports are essential to the review. Overemphasis on past performance, however, could inappropriately discourage young investigators. We believe strongly that the process must be supportive of young investigators and suggest that NASA consider formally encouraging senior investigators to include younger scientists (past the post-doctoral level) as co-investigators. We note that this does not address the importance of increasing the number of younger scientists that are Principal Investigators, and this issue needs to be addressed by NASA .

Finally, procedures should be implemented to communicate review results to the proposers as early as possible. For instance, disposition of any subset of decisions which is final should be communicated immediately rather than waiting for the definitive outcome of all.

To summarize, we find that clear and timely communication is at the heart of a successful peer review process. We believe that greater care must be given to writing NRAs and that, where necessary, they should be rewritten entirely rather than edited piecemeal from year to year. We further observe that any decisions should be communicated as early as possible even if all decisions are not communicated at the same time.

Innovative Research

We do not find any evidence that peer review stifles innovative research. We do advise that the Panels and the mail reviewers be reminded of the concem that innovative research does not fare well in peer review, though we did not find any basis for this concem. The existence of the Innovative Research Proposals can serve as a healthy insurance policy against conservatism in the traditional disciplines; therefore, we are disturbed about the current workload associated with the Innovative Research NRAs.

We believe that the Innovative Research Proposals should be reviewed by the same process of mail and panel reviews as are the Discipline Proposals, rather than by in-house staff as is often the case currently; however, the enormous oversubscription ratio for this program clearly calls for some pre-screening by program managers to ensure that all prior knowledge is taken into account. At this stage of screening, prior rejection of a proposal on the grounds of riskiness, skepticism, or uncertainty should not be held against it, but prior rejection on the grounds of poor or low-impact science could be. This would be facilitated if Discipline Review Panels were specific as to the reasons for their low evaluations. We are particularly worried about the tendency of proposers to use this NRA as a means of resubmitting any rejected proposal, whether innovative or not.

Effectiveness

We recognize that the effectiveness of the peer review process must be measured and that this evaluation then should be used to further improve the process. We suggest that a formal review of the peer review process be held a) every five years and b) after any significant changes in the structure or operation of OSS. In this latter regard, we observe that a review in three years following the formation of the new organization would be reasonable.

Management

We believe that the workload associated with the peer review process, on managers, proposal writers, and reviewers, is a threat to the system and that means of better managing the tasks must be found. As previously stated, we do not recommend any reduction in the effort expended or expertise employed in the actual science evaluation portion of the overall process. We believe that programmatic decisions must be kept at Headquarters. Moreover, Headquarters must take the lead in the selection of mail reviewers and panel members and this requires expertise and conscientiousness. These activities must be conducted by scientists knowledgeable in the relevant field. We are apprehensive about the potential loss of this available expertise at NASA Headquarters or at the Centers to which the process may be delegated. As an extension of this line of thought, we believe that there are significant benefits to NASA and to space science in maintaining a vigorous IPA program. Science managers benefit from timely information about the state of scientific disciplines; this information is most readily obtained from active scientists serving with the managers at NASA Headquarters in an IPA capacity; moreover, important information about the characteristics and inner workings of scientific programs proceeds back to the community through the IPA. It is a two way street with benefits flowing in both directions.

In sum, intense, intimate cooperation of active scientists and experienced program managers is essential for achieving successful panels and useful mail reviews, and the present level of management and science expertise at NASA Headquarters should be maintained through a mix of career program scientists and IPAs. We find, however, that certain functions in the peer review process could be re-located to better balance the workload. For instance, the writing of NRAs, the logging of proposals, the contacting of reviewers (following selection at Headquarters), the monitoring of the status of proposals, and the procuring could be done at NASA Centers and Institutes. In addition, expanded use of electronic communication should be investigated; however, the present rapid changes in the World Wide Web and the Internet make any specific recommendations at the present time risky. We instead suggest that NASA Headquarters wait two to three years before implementing a specific strategy for use of electronic media in the review process. Moreover, in implementing procedures for utilizing electronic information, a system viewpoint must be taken to be certain that efficiencies are actually being realized and that burdens have not simply been re-shuffled.

Finally, one strategy that should be considered for reducing workload in writing and reviewing proposals is to lengthen the proposal cycles where appropriate. We note that the observing programs are possible exceptions to this suggestion.

In closing, we express our appreciation for this opportunity to serve NASA and the Office of Space Science. More importantly, we express our deep appreciation for the many years of distinguished service that you have given the science community. The example that you set is a challenge to all.

Warmest regards on behalf of the Peer Review Process Team.

Sincerely,

Berrien Moore III
Chair
Peer Review Process Team

Attachments/3
cc) Peer Review Process Team
    H. Brinton
    M. Mellott
    G. Riegler
    C. Sorrels

Peer Review Process Team

Chair: Berrien Moore, University of New Hampshire

NASA HQ: Carrie Sorrels, Executive Secretary
Guenter Riegler, NASA Team Leader
TBD Space Physics Representative
TBD Solar System Exploration Representative

Members: David Black, Director
Lunar and Planetary Institute

James Burch, Director
Southwest Research Institute

Geoff Clayton
University of Colorado

Nancy Crooker
Boston University

Jeff Cuzzi
Ames Research Center

Vicki Hansen
Southern Methodist University

Janet Kozyra
University of Michigan

Lucy-Ann McFadden
University of Maryland

Rich Mushotsky
Goddard Space Flight Center

Nolan Walborn
Space Telescope Science Institute

Peer Review Process Team
DRAFT Agenda

September 6

8:30 - 9 am	Opening Remarks	Moore
9:00 - 9:45	Overview of Grant Selection Process	Riegler
9:45 - 10:15	Space Physics	
10:15 - 10:45	Solar System Exploration	
10:45 - 11:00	Break	
11:00 - 11:30	Astrophysics	Riegler
11:30 - 12:00	Discussion	
12:00 - 1:00	Lunch	
1:00 - 2:00	Survey Results	Sorrels
2:00 - 3:30	Panel Discussion of Topics	Riegler/TBD Others
3:30 - 5:00	Discussion, Q&A, Assignments	Moore
7:00	Dinner	

September 7

8:30 am	Writing Session & Wrapup
12:00	Adjourn

NIST
UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899
OFFICE OF THE DIRECTOR

AUG 1 1996

Honorable Robert S. Walker
Chairman, Committee on Science
House of Representatives
Washington, D.C. 20515-6371

Dear Mr. Chairman:

I am enclosing the answers to your additional questions to be added to the record of the July 10, 1996, hearing on the Civilian Science Agencies' Implementation of the Government Performance and Results Act (Public Law 103-62).

We appreciate your Committee's interest in the activities of our Institute and in our efforts to provide the basic measurements and technology infrastructure essential for maintaining the competitiveness of U.S. industry.

Sincerely,

Robert E. Hebner
Acting Deputy Director

Enclosure

Questions submitted by Committee on Science for inclusion in the July 10 hearing record on the Civilian Science Agencies' Implementation of the Government Performance and Results Act:

1. Have you encountered conflicting stakeholder interests in the development of your strategic plan? If so, how have you resolved conflicting stakeholder interests in the development of your strategic plan in order to reach consensus on goals and priorities?

No, NIST has not encountered a conflict of interests by its stakeholders in the development of its strategic plan. NIST has a mission to promote U.S. economic growth by working with industry to develop and apply technology, measurements, and standards -- providing the basic technical infrastructure needed by industry to transform technology into the profits and jobs that yield the true returns to the American taxpayers. This mission has been embraced by its stakeholders and its principal customer, U.S. industry, and NIST's strategic plan focuses on accomplishing this mission.

In the implementation of the strategic plan, NIST has encountered conflicting stakeholder interests in situations where stakeholder interests exceed available resources. In these cases, it is necessary to set priorities among the needs (interests) of our stakeholders and satisfy those needs which have the highest priority according to the criteria enumerated below.

All of NIST's programs involve extensive interactions with customers and stakeholders, which include U.S. industry and government, universities, the technical and scientific communities, and foreign counterpart laboratories. NIST seeks and relies on industry input on the direction and content of its programs at several levels of organization. Ultimately, NIST programs set their priorities in accordance with these criteria:

- the magnitude and immediacy of industrial need;
- the degree of correspondence between a particular industrial need and NIST's mission to develop infrastructural technologies;
- the opportunity for NIST participation to make a difference;
- the nature and size of the anticipated impact resulting from NIST's participation;
- NIST's capability to respond in a timely fashion with a high-quality solution; and,
- the nature of opportunities afforded by recent advances in science and technology.

The NIST strategic planning will continue to be developed in consultation with the customers and stakeholders identified above. The mark of good management is the ability to integrate customer needs and to optimize the application of the available resources--financial, technical, intellectual, and manpower. The key to identifying these needs is communication. And, NIST has in place excellent mechanisms for communicating with its customers.

2. Since GPRA activities are primarily agency specific, how will NIST adequately assess those activities that involve programs or have broad benefits across many agencies or fields of science? Many NIST projects involve partnerships with other federal laboratories, universities, and companies. How does NIST assess its own performance from the aggregate outcomes of these partnerships?

We agree that NIST programs have broad benefits. For example, NIST tools and services are the ultimate references for the hundreds of millions of measurements made daily by U.S. companies, small and large, and are vital to the functioning of the entire economy. This question addresses the problem of assessing infrastructural activities that are at the core of NIST's mission, in addition to the more general problem of assessing the impact of science and technology activities.

NIST uses review panels to assess and advise its programs at all levels. Its statutory advisory committee, the Visiting Committee on Advanced Technology (VCAT), reviews NIST's programs and operations on a quarterly basis, including NIST's customer and stakeholder interactions. NIST laboratories are rigorously assessed each year by the National Research Council's Board on Assessment of NIST Programs. These peer review panels provide expert assessment of quantitative measures of performance that have and will be used, an assessment that goes beyond mere numbers to the quality and relevance of these measures. Peer review is non-quantitative by its very nature, but can effectively and adequately measure the degree to which an organization is perceived by its customers and stakeholders as fulfilling its mission.

In recent years, NIST has undertaken a number of econometric studies for programs conducted by the NIST laboratories, the Manufacturing Extension Partnership, and the Advanced Technology Program. These studies attempt to assess the broad benefits derived from NIST programs. An example of one of the studies done by the NIST laboratories is the "Economic Impacts of NIST-supported Standards for the U.S. Optical Fiber Industry: 1981-Present." This study explicitly considers the NIST role in partnering with the entire fiber optic industry to develop and implement 22 significant fiber optic standards. The broad benefits include producer and user cost savings, higher quality fibers, and a domestic industry which is more competitive in the global optical fiber market.

Indeed, NIST has a long tradition of partnership with U.S. industry, other government agencies, and universities. In these partnerships, priorities are set and outcomes are defined. The aggregation of these outcomes relative to goals and objectives in NIST's strategic plan provides an appropriate organizational measure of performance. The assessment properly should be made on the basis of quality, relevance, and productivity. Although customer evaluation and internal assessment can address aspects of this process, peer review provides a perspective, a point of comparison that can be gained in no other way. Credibility is achieved by the depth and independence of the peer review process. NIST feels that its present review processes are well suited to the task of program evaluation.

3. How is NIST working with other agencies to address common GPRA implementation issues and establish consistent performance assessment methodologies?

NIST participates regularly in an ad hoc interagency discussion group that has been addressing the issues of applying the GPRA to organizations doing applied and basic research as their mission. This "Performance Measures and Research Round Table" held its 16th and most recent meeting June 18, 1996. The participants of the Round Table have shared their experiences with the development of strategic plans and performance measures. Participants include NIH, FDA, HHS, EPA, USDA, Army, DOE, DOI, NSF, as well as a number of other federal organizations. Guest speakers from OMB and OSTP have provided their insights at these meetings. NIST hosted the 15th meeting of this Round Table and presented its GPRA-related activities. The Round Table produced a white paper in August 1995 that expounds a performance measurement model for research. This model proposes that the dimensions of performance for research--relevance, productivity, and quality--can be assessed to differing extent by three methods--peer review, metrics, and customer evaluation.

The Subcommittee on Research of the Committee on Fundamental Science (CFS) of the National Science and Technology Council (NSTC) and the Office of Science and Technology Policy (OSTP) has also studied "Assessing Fundamental Science". NIST representatives participated in a November 1994 workshop that examined the issues and a May 1995 colloquium that explored methods that might be used to assess the contributions of fundamental science to the national well-being. NIST was represented on the Subcommittee by Dr. Katharine Gebbie, Director of NIST's Physics Laboratory. The Subcommittee has prepared a report summarizing their findings. One conclusion was that "effective assessment methods will be agency- and program-specific."

The Research Round Table has made no effort to establish a common performance assessment methodology. It is recognized that each organization needs to adapt the requirements of GPRA according to individual mission, planning, budgeting, and assessment environments. The key common point is to use performance information as a basis for good decision making--decision making that is used to improve delivery of well-defined government services. The GPRA should allow for healthy differences in how performance is both defined and measured.

NIST's approach to GPRA is centered on the development of a strategic plan and specific goals and procedures to meet that plan. The strategic plan is executed via the individual performance plans of NIST managers and staff. The goals and objectives in the performance plans are consistent with the overall NIST strategic plan.

4. In implementing the accountability provisions of GPRA, program managers will naturally tend to emphasize what they can count and, perhaps, what they can easily achieve. Will setting goals for science stifle creativity or risk-taking and encourage an overemphasis on outputs and outcomes that are countable? How does NIST assess the marginal benefit of investing incrementally in an existing field of science versus investing in a fundamentally new, but less predictable, scientific or technical endeavor?

Quantitative measures cannot be the only mechanisms used to predict successful performance of science and technology activities, as has been emphasized again and again, because they do not address the quality and relevancy aspects of work. "We must avoid allowing what can be measured to become what matters, rather than seeking to measure what matters--which are frequently attributes that cannot be quantified."[1] The science and technology related agencies have been concerned about this principle from the outset in implementing GPRA. Quantitative measures can be useful, but their limitations need to be understood. For this reason, it is important that sufficient latitude be allowed in GPRA implementation.

The answer to the second question was partially addressed in the answer to question 1 where the criteria for setting priorities were listed. These criteria allow for investing in expansion of existing programs and investing in fundamentally new directions. One way that NIST addresses this question is by maintaining a portfolio of high-payoff projects which have varying degrees of risk. By regularly re-evaluating this portfolio of projects using the priority setting criteria, NIST attempts to maintain a healthy balance of more predictable and more risky research.

NIST recognizes that priority setting is a difficult process, and not necessarily straightforward. The process of stopping good work in order to start better work is not an easy one. However, NIST has developed an allocation process for its research funds that provides for reinvestment into new and promising programs. Ultimately, priority-setting decisions rely on the judgements of technically competent managers made within the framework of good management practices.

[[1] Quantitative Assessments of the Physical and Mathematical Sciences: A Summary of Lessons Learned. NRC Commission on Physical Sciences, Mathematics, and Applications. National Academy Press: Washington, DC, 1994]

5. How do the bench scientists and research managers at NIST feel about performance assessment? How do you assure that performance assessment is valued by and integrated into the organizational culture, rather than just a data collection activity?

Performance assessment is an essential part of NIST operations. It has been integrated into its personnel management through the innovative Personnel Management Demonstration Project (PMDP) which began on January 1, 1988. This system provides for "pay for performance" and performance is measured against a "performance plan" that each employee establishes with his/her supervisor. These performance plans are a very effective way of bringing the broad strategic goals of the organization to the bench scientist and in the definition of specific activities that are ultimately tied to these goals. Professional recognition and monetary reward are tied to performance and are valued; these are very strong incentives.

Performance assessment is also integrated into the organizational culture by the participation of the NIST staff in both the planning and evaluation processes. It is the bench scientist who helps to identify the specific metrology needs of the nation by organization of workshops, leadership in standards organizations, and attendance at research fora. It is also the bench scientist who actively participates in the National Research Council's annual assessment of our laboratories. This external peer review by the NRC forces introspection and justification of individual NIST activities. Because quality and relevance are included, the assessment process becomes much more than a data collection activity for the bench scientist and research manager.

6. NIST uses the National Research Council's Board on Assessment to annually review NIST's programs. Is this a good peer review model for other programs and agencies? What are some of the pros and cons of this assessment approach?

The NRC assessment process works very well for NIST. Since the assessments began in 1959, the specific activities of the Board on Assessment have evolved. The Board continues to assess the national importance of the programs, the technical merit of the effort, the quality of the staff, the state of the equipment, the adequacy of financing, and priorities in the context of U.S. need. The NRC provides the wherewithal that can adequately conduct such an assessment--independence, impartiality, and access to broad pool of qualified experts. The Board oversees the work of over 150 professional scientists and engineers each year who donate their time to perform this assessment. These volunteers represent NIST customers and stakeholders (in 1995, 56% came from the industrial sector). Volunteers agree to serve because of their recognition of the importance of NIST activities to the nation.

Peer review has been recognized as a important component of performance assessment for research. Many of the participants of the Performance Measures and Research Round Table have indicated that peer review processes are part of their organizations' assessments, and these peer review processes vary widely. Each organization needs to develop effective peer review processes according to its needs, just as each organization needs to adapt the requirements of GPRA according to its mission, its planning, its budgeting, and its assessment environments.

The NRC assessment process of the NIST laboratories is not perfect, but it works. The mismatch between the timetable of the GPRA/budget process and formal output of the NRC review process is a concern, but the ongoing nature of the NRC assessment provides continuity that more than compensates for a time lag in the assessment process. NIST will explore the modification of its NRC review process, if it will be beneficial to NIST's implementation of the GPRA.

The NRC reviews the seven NIST Laboratory Programs and NIST and NRC are discussing review of specific aspects of the Advanced Technology Program. This process appears to work well for cutting edge technical programs that are intended to significantly impact the U.S. economy through changes in industrial practice. We have no information as to how the process might work if the programs reviewed were directed toward a different goal.

7. NIST has used economic impact analyses to demonstrate a high social rate-of-return for many of their programs. Do these retrospective studies provide guidance on predicting high social returns for on-going or proposed work? Should a high social rate-of-return be the economic figure-of-merit for federally-funded programs? How do you assess the economic impact of NIST programs in the aggregate?

Yes, these retrospective studies do provide guidance. The types of technology infrastructure provided by NIST to industry fall into a limited number of categories. As economic impact studies are completed on projects in each category, NIST's ability to assess both the type and magnitude of impacts from new projects increases. We have identified major types of impacts from the studies done to date that had not been anticipated when the work was undertaken. This new information is extremely valuable.

No, a high social rate-of-return is not an appropriate general figure-of-merit, especially for federally-funded organizations whose missions are not primarily economic. A high rate-of-return does not, by itself, rationalize a Federal role. Additional economic analysis must be undertaken to determine if and why the private sector is not making the investment sufficient to attain these returns. For technology, the social rate-of-return indicates the value of the technology to society. The estimated social rate-of-return for a completed, Federally-funded project provides just one indicator of the project's success in removing the market failure that led to under investment by the private sector. Also, we should not overlook the difficulty in determining economic impact--impacts for some types of technology infrastructure are considerably easier to estimate than others. Therefore, resource allocation should not be done using this metric as a "figure of merit."

Aggregate economic assessment is fraught with difficulty, not the least of which is the cost. NIST laboratory projects are numerous and typically last several years. The time between investment and pay-offs for these projects can be long. Massive amounts of impact data would be required. Thus, a comprehensive, simultaneous, quantitative estimate of an aggregate impact of NIST programs will be inherently impractical. The alternative approach that NIST uses is the funding of a limited set of studies per year. In this way, NIST is accumulating economic impact information for a representative cross section of infrastructural NIST technology research projects. The sample was never intended to be random, but is targeted to be valuable for qualitative, qualified evaluation purposes.

8. How will performance information in GPRA be linked to or used in budgeting for research? What will happen to a research program if it cannot meet its performance goal?

We anticipate that performance information in GPRA will be used broadly and only indirectly linked to the budgeting process for research at NIST. That is, we believe that NIST research programs will be disaggregated relative to specific GPRA performance measures. However, individual research projects will continue to be evaluated as part of NIST's good management practices. Projects will stop and start according to the priorities of our organization and their progress and perceived impact. This process is happening now and will continue to happen.

9. How do you expect the implementation of GPRA will effect your interactions with the scientific community, Congress, and the public?

Implementation of GPRA will probably have little impact on our customers and stakeholders. NIST is held already in great esteem by the scientific and technical community who honor its impartiality and the breadth and quality of its work. NIST management practices have been praised, as in the Council on Competitiveness report, "Industry as a Customer of the Federal Laboratories" (Washington D.C. 1992) which describes the NIST laboratories' process of working cooperatively with industry as "the most streamlined of all and is perhaps the best model for other federal labs to follow....NIST is very flexible and able to respond quickly to industry's inquiries without bureaucratic interference." NIST's traditional operational culture is a solid base upon which GPRA framework will be added.

10. What do you believe are the primary benefits of GPRA for your Institute? What are the costs of implementing GPRA? Do you think the benefits of GPRA will outweigh the costs?

Business planning and performance evaluation are the hallmarks of good management--and are also the two basic components of the GPRA. NIST has already embodied the tenets of GPRA in its operations: NIST focuses on its unique mission; NIST includes stakeholders and customers in the development of its priorities; and, NIST relies heavily on the evaluation of its work to ensure that its impact is optimized. Thus, it is good management practices that drive NIST activities. NIST will continue these good management practices in responding to the requirements of GPRA.

It is exceedingly difficult to predict either the cost or the benefit that will accrue to NIST because of GPRA. NIST spends about $1M each year to commission the NRC Board on Assessment of NIST programs described above. This expenditure plus the time of NIST staff in preparation and execution is significant, but as also described above was initiated because it represents good management practice--not to satisfy the GPRA legislative mandate. The costs of GPRA will ultimately depend on the flexibility accorded in its implementation and the extent to which existing management practices can be adapted to satisfy this implementation.

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